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ABSTRACT

This document presents a conceptual model and applied framework for the small college to implement income contingent loans. Results of a Pay-As-You-Earn (PAYE) questionnaire indicate the utilization potential and attractiveness of the model. Further discussion concerns some prospects, the break-even tax rate, liquidity, the accumulation of debt and the administrative function. Conclusions suggest the need for implementation of a pilot PAYE program. Appendices include the PAYE questionnaire and questionnaire tables. (MJM)

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MIDWEST ASSOCIATION OF STUDENT FINANCIAL AID ADMINISTRATORS

INCOME CONTINGENT LOANS: CONCEPTUAL AND APPLIED FRAMEWORK FOR THE SMALL COLLEGE

By
George Lamson
Marv Johnson
David Lundeen

MASFAA MONOGRAPH SERIES
Number 2

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George Lamson
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Introduction

THE CONCEPTUAL MODEL

The Earliest Conceptual Framework

There is still almost universal academic and lay acceptance of the proposition that higher education is a "good investment." For most, the prospects of significantly increased earnings for college graduates seem to far outweigh the costs of four years of foregone incomes while in college and four years of tuition payments. These widely-held intuitive beliefs, moreover, have been confirmed again and again by formal estimates of private rates of return on education.[1] Even after abstracting other influences on earnings which may be found in larger measure among college graduates than in the population as a whole, e.g. greater ability, motivation, and the like, it seems safe to say that the average dollar invested in a four year college education in the 1950's provided a yield of from 10 to 15 per cent to the average student in the form of higher lifetime earnings.

Yet, higher education is increasingly beset by a "financial crisis" that is perceived as being, at least in part, due to an inability to raise tuitions and other educational expenses consistent with rising costs without losing many qualified applicants. Students are seen as being unwilling to finance anything approaching the "full" direct costs of their college education even though under these circumstances they would still earn rates of return far in excess of normal market yields.

The PAYE Plan and other income-contingent loan programs have essentially developed out of this paradox of a "good investment" which the average student and his parents seem neither willing nor able to finance themselves. While much has been claimed for it since it was originally proposed in the mid-50's,[2] the income-contingent loan is still basically viewed as a means of improving an otherwise imperfect "educational capital market" and making more palatable the self-finance of education. Its original proponents were concerned with explaining why private capital funds financing, say, 6 per cent home mortgages were not instead being used to finance 10 to 15 per cent "investments in human capital." Their hypothesis was that neither borrower nor lender were willing to finance a high yield college education with conventional loans because of the high degree of risk attached to the expected future incomes of the borrower and the absence of appropriate collateral. The income-contingent loan, in turn, was seen as a means of pooling or mutualizing these risks thereby increasing both the student's and the institution's willingness to utilize educational loans as well as the student's access to them.

More precisely, the high average rate of return on college education found by Becker, Schultz, etc. obscured an equally high degree of variability in expected returns. To be sure, the average student could more than cover his borrowing costs out of increased future earnings. However, fully 20 per cent of all college graduates typically do not earn even the mean salary of a high school graduate.[3] Few investments in physical capital would be made where there is a similar one-in-five chance of no net yield, and there seems no reason why an educational investment would be any more attractive. The willingness to borrow for education under these circumstances would depend as much on the student's (or

parents') attitude toward risk, for which people typically have little tolerance, as on the high average, expected yield. As one author put it, only the "self-confident" would borrow for education.[4] Moreover, the educational loan has the added disadvantage of offering the lender no collateral. Even with a high risk of default a loan for a physical capital item may still be extended as long as the lender can expect to at least repossess the equipment he has financed. Obviously, no such possibility exists with an educational loan.

The PAYE Plan was to have solved these difficulties in part by basing loan repayments on the borrower's income. Rather than repaying in fixed annual installments which might be excessively onerous should he be financially unsuccessful, the borrower was instead to pay a fixed proportion, i.e. the "tax rate," of his annual income--a large dollar amount if he were successful; less, if he were not. The lender, in turn, was to choose a "break even" tax rate which was sufficiently high to assure an average rate of return on all educational loans equal to the rate of return on alternate investments. The financially successful borrower would, in effect, subsidize the financially unsuccessful, but this was viewed as a small price to pay for the ex ante reduction in the risk of default and financial embarrassment for all borrowers. Only the very self-confident student certain of high future incomes, it was argued, would find the PAYE Plan unattractive.

Conceptually, the PAYE Plan borrowed heavily from the principles of insurance or "risk mutualization" which accounts for its heavy use of such terms as "actuarial likelihoods," "risk pooling." The student borrower, it was argued, would be quite willing ex ante to contract to (possibly) pay "premiums" against the risk of low incomes and financial insolvency even though these eventualities might never be visited upon him. More precisely, he was seen as having little real knowledge ex ante, of his individual income prospects and as being willing to insure against an onerous debt burden were he financially unsuccessful by assuming an obligation which might potentially cost him more than fixed interest loans at conventional market rates were he financially very successful.

Thus, in its earliest form it was the high income earner who ex post would "pay" for the freedom from insolvency the PAYE Plan afforded the low income earner. However, as we shall expand upon below, this aspect of the Plan has been less and less emphasized as time has passed. The assumption that students have no real knowledge of income prospects may well be false. Indeed, individual students may even know better than the lender what their future incomes will be thereby causing a "certain adverse selection of risks to develop." As one early author observed:

> "students with great confidence in their own economic future would tend to minimize their use of the plan. . . to avoid a large share in making up the deficits produced by the less successful students."[5]

As a consequence, much attention has since been given to PAYE Plan provisions which presumably minimize adverse selection by limiting the rate of return high income earners can pay and therefore the degree of internal subsidization.

In fairness to its early proponents it should also be emphasized that the PAYE Plan was not seen as a solution to a deepening financial crisis in higher education or as one means available to the individual college to increase its

competitive advantage vis-a-vis other schools. Theirs was a broader social concern that there were, then, "too few" students in institutions of higher learning because of the lack of suitable means of educational self-finance. It is, of course, no less true that as alternate forms of finance have dwindled and the costs of education have increased, the PAYE loan can also be rightfully justified as a "second best" means of maintaining existing enrollment levels. It is unfortunate, however, that it is also now being viewed as a means of shifting enrollments between public and private institutions or reversing a shift away from private institutions.

Besides its obvious advantages in reducing risk and restrictions on job choice, the income-contingent loan was seen as having numerous side benefits. Colleges, it was argued, would take a far more active interest in a student's financial success if their loan receipts were based on his income and would revise curricula and teaching methods accordingly. An additional imperfection in the conventional educational loan market had been the tendency for lenders to limit loan sizes to unrealistic, low amounts, and the PAYE Plan was seen as eliminating this practice. Borrowing limits result primarily from rules-of-thumb applied by conventional lenders fearful of borrowers defaulting due to excessive borrowing and could be eliminated as default risks were reduced. Associated with this would be an elimination of "need tests" and similar restrictions on the type of borrower to be financed. Since the PAYE loan was to be self-supporting and tax rates to be chosen to meet the private market test, there was no need to determine who was "worthy" enough to receive a subsidized loan.

One additional question posed by an early proponent of the PAYE Plan, Milton Friedman, is often overlooked today.[6] Why, he queried, hadn't private lending institutions already developed a similar program if tax rates could be chosen to make it profitable? The notion of an income-contingent or "variable return" loan is after all not new. Equity or "stock" finance bases "loan repayments" (dividends) on a firm's income (profits), and banks have experimented (without much success) for many years with home mortgages where interest rates vary with the borrower's age and presumably his income. Friedman's explanation of this paradox centered on the high costs of administering the program. The costs of collecting and verifying loan repayments as well as the "start-up costs" associated with determining actuarial likelihoods, he argued, would be prohibitive for a small firm. There were economies of scale in these functions which could be exploited only by a nation-wide Educational Opportunity Bank. The individual firm (or school!), therefore, was not the appropriate institution to organize or initiate the program.

The PAYE Plan poses one final question which has received little attention even from its original proponents: the so-called "liquidity" problem. This problem may itself go a long way in explaining why private lending institutions have not already developed PAYE programs. No matter what institution administers the program, there must be some fairly substantial initial accumulation of debt. To be sure, if the PAYE, "break-even" tax rates were successfully chosen to cover these borrowing costs, then in the long run the program would be self-liquidating or self-financing. However, these PAYE yields would be only "expected" or "predicted" yields determined on the basis of uncertain income prospects and available only in the far future, whereas the current liabilities (the so-called senior debt) would probably be fixed interest obligations, subject to possible change as market conditions varied, and of a fairly short-run nature. At least at its

inception, the PAYE lending agency would have a portfolio much like a mortgage bank, holding high yield, long-term assets (its PAYE loans) matched by (hopefully) lower yield, short term liabilities. And, like a mortgage bank it would presumably have to maintain some liquid reserve or have a highly accessible line of credit against unexpected increases in short-term borrowing rates or declines in PAYE yields.

The liquidity problem, moreover, would be exacerbated if the PAYE Program were to be administered by an individual school. Typically, trustees, administrators and the constituencies they serve have little familiarity with or tolerance for debt accumulation. What, for example, would trustees think of a $350,000 accumulated short-term debt in the seventh year arising out of a very modest program which extended $250,000 over a four-year period and was terminated thereafter? What funds would they be willing to set aside as liquid reserves and how costly would these be in terms of foregone endowment income?

In answer to these questions about all that can be specified a priori are case flow models which seek to estimate the stocks of debt at various time intervals after the inception of the program and the length of the period before all accumulated debt is repaid. Answers to other questions regarding the alienability of endowment funds as liquid reserves or collateral, the marketability of of the PAYE loan, borrowing terms such as maturity, amount of refinancing permitted, the variability of borrowing costs, etc., must all await actual negotiations for the Plan.

Historical Development

Since the mid-50's this tight, neatly formulated, and very logical conceptual framework for the PAYE Plan has considerably loosened. Critics and proponents alike have tended to play down its major conceptual goal of "making more palatable the self-finance of education" through a reduction in borrowers' and lenders' risk. Few acknowledge explicitly that it cannot help but shift somewhat the burden of educational finance to the student. Moreover, as suggested above, it is increasingly viewed as a means of maintaining existing enrollment levels in the face of rising costs or (for private schools) in the face of increasing tuition differentials between public and private institutions rather than expanding enrollment levels.

Perhaps most important, however, there is increasing but still casual evidence that its principle assumptions regarding student willingness to borrow for educational self-finance are empirically false. Simply put, it was assumed that students would be more than willing to finance rising educational costs through self-liquidating loans as long as the risk of financial embarrassment could be eliminated ex ante through an income-contingent repayment system and through some form of mutualization. And, associated with this, all potential borrowers whether with high or low ex post earnings profiles would be equally uncertain about future incomes hence equally willing to insure against the risk of low incomes.

Yet, according to one source:

> "Our tentative feedback on field tests of questionnaires suggest that students are intrigued with the idea (of a PAYE Plan) and they are more concerned with keeping (total) repayments low (avoiding long term and/or high interest rates) than with

minimizing their annual repayment burden or with mutualizing the risk of low incomes."[7]

Moreover, the closer the Plan has come to realization in the several schools employing it or contemplating its use, the more limits have been placed on the degree of subsidization of the low income earner by the high income earner, i.e. in the degree of internal subsidization. Nearly all plans contemplate an individual opt-out provision which limits the amount a borrower need repay should his income reach very high levels. Under Yale's PAYE Plan, for example, an individual opting out in the 20th year after his graduation would have paid an effective yield on his loan of no higher than 10.6 per cent.*

The opt-out provision now masquerades under a different name coined by the Ford Foundation, the so-called "variable term loan" (VTL). Under the plan a student contracts to repay a given per cent of his annual income (i.e. on an income contingent basis) until the loan plus (predetermined) interest is repaid or until a maximum repayment period is reached."[8] This amounts to nearly the same thing as the opt-out provision except that the "penalty" payment of 50 per cent of the principal plus interest is de-emphasized and the emphasis is instead placed on the effective interest rate to be paid. There is, however, no obvious difference between the statements: "your obligation is terminated when you have repaid $1500 (including penalty) plus accumulated interest on the amount at 7%" and "your obligation is terminated when you have repaid $1000 (the amount borrowed) plus accumulated interest at (a penalty rate of) 10%."

Finally, Yale has adopted a "cohort provision" which, in effect, limits subsidization to one group of borrowers, the class cohort. Under this provision the group's obligation to repay is specified ex anteas a fixed amount (like the individual's obligation under the VTL) equal to the cohort's total borrowing plus accrued interest at the "Target Rate" approximating Yale's costs of borrowing and administration. Individuals continue to make repayments based on their annual income, and high income earners still subsidize other low income earners within the cohort. However, should the group repayments exceed its fixed obligation, repayments would be terminated rather than being used to finance other cohorts.

All of this would suggest that there is not only less borrower interest in

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*According to Yale's opt-out provision, the individual's obligation to repay is terminated when his total repayments "equals i) 150% of the principal amount he deferred plus ii) interest, compounded annually to the date of his last payment at the Contract Interest Rate (Yale's borrowing costs plus cost of administration), on 150% of the amount he deferred." If a borrower opted out under this provision, if the Contract Rate were 7%, and if he had initially deferred $1000, the accumulated repayments up to the 20th year would be $3,242. A conventional $1000, 20 year loan with similar total repayments would have had an effective yield of 18.6 per cent.

A small complication with this example is that the PAYE borrower's annual payments would not have been an equal annual amount as with a conventional loan but smaller in the earlier years, rising in later years as income rises. This would mean that the effective yield of the PAYE loan would be somewhat lower, e.g. 10.6 per cent. Finally, an illustrative income pattern yielding these repayments would be a starting income of $10,000 rising at a constant 12.6 per cent rate to $95,330.

insuring against the risk of low incomes than once thought but considerable pressure by borrowers under contemplated or existing programs to limit the disadvantages of earning a high income by limiting the degree of internal subsidization. Put differently, potential borrowers do have some knowledge of their future income prospects, and those with high ex post incomes would be "adversely selected out" of the program without these limits. The limits in a sense bribes them to remain in the program and to pay some "smaller subsidy" by restricting ex ante their maximum obligation and the possibility of a large subsidy.

It is very difficult to assess a priori the effects of these automatic exit provisions. On the one hand, if there is little risk of adverse selection even without the exit provisions, then including the provisions in the program would obviously raise the tax rates to all borrowers beyond what they need be; borrowers who would have paid a high ex postsubsidy anyway would be limited by the exit provisions to a smaller subsidy. However, should there be a high risk of adverse selection without the exit provision, then its:

> "'costs' (expressed in terms of higher tax rates) would be more than offset by [its positive effects of high income earners'] willingness to participate, i.e., its inclusion should help reduce the risk of adverse selection by ensuring no one would be really 'taken'."[9]

In short, no-one could specify a priori if the break-even tax rate must be higher or lower with and without the opt-out provisions.

The exit provisions, however, may be unambiguously advantageous in another respect; they may help to reduce the risk of default (if important) among high income earners. Although never made explicit, there is obviously an assumption among proponents of the PAYE Plan that the burden of debt hence the risk of insolvency is measured best by the ratio of debt repayments to income (R/Y). Indeed, the basic notion of "income contingent" repayments is to keep this ratio constant and low for any individual borrower regardless of income. However, it is possible that default risks or better, the risk of "unwillingness to repay," are also related to the absolute level of debt repayments and to the length of exposure to the obligation. No matter how high his income a borrower may consider equivalently high dollar debt repayments "inequitable" or "excessive" by contrast to a fixed interest obligation and refuse to repay. A long term of repayments also clearly increases the risks of borrower death and simply "losing track" of him. It is difficult to see how the exit provisions would significantly reduce default risks from very long repayment periods although they would undoubtedly reduce the average borrower's term since some would opt-out early. However, they clearly reduce the possibility of felt inequity from very large annual dollar payments and whatever default risks no matter how small, associated with them.

These are by no means the only conceptual relaxations that have occurred in the original concept of the PAYE loan. Others include:

1. An increasing tendency to present as advantages unique to the PAYE Plan those advantages shared with any successful educational loan program. The Zaccarias Report,[10] for example, emphasized the "regional racial and socio-economic equalization" in educational opportunity the Plan would produce. It also claimed that the Plan would "increase the viability of private institutions of higher learning," increase the student's responsibility for their own education and

"reduce demands by middle-income parents that (educational) expenditures be made tax deductible."[11] Others have defended the Plan as providing the student opportunities for earlier maturation and independence from undesired parental influence, as helping parents send a younger brother or sister to college, and even as providing the student greater educational flexibility in attending expensive off-campus study programs. All of these objectives could be in some measure accomplished by a conventional loan program as well if only students would utilize it. Thus, the PAYE Plan must be ultimately appraised not on these criteria but on whether its unique characteristics, its risk reduction through income-contingent repayments and mutualization, are attractive enough to the student to induce greater self-finance than under a conventional program.

2. A certain degree of interest in the plan by private lending institutions that may reflect more a desire to pass on the burden of default risk to the individual college than any positive assessment of the financial soundness of the program. Most PAYE proposals foresee the individual college or a group of colleges in effect serving as guarantors of the PAYE loan. Banks and insurance companies would merely extend the college or colleges conventional loans (presumably at "prime rates") to cover the deferred tuitions, and the college (s) would in turn assume the task of collecting and administering their PAYE loans. The banks would in no obvious way bear the risks of PAYE default. This is in sharp contrast to current, educational bank loan programs. Even under the system of federal guarantees, banks must now show evidence of considerable (and costly) effort to collect loan repayments before the Federal guarantee will be acted upon favorably.

3. A "regrettable" tendency "to confuse the student loan issue with the general public policy question of how much of the cost of education should be borne by the student and how much by the taxpayer."[12] We should emphasize again that the earliest proponents of the PAYE Plan foresaw it reallocating private capital funds from non-educational activities to (presumably higher return) educational enterprises. This was either to permit higher enrollment levels or to maintain existing enrollment levels with rising educational costs. Increasingly, however, there is evidence that both critics and proponents alike view it as a means of reallocating a fixed or even declining volume of educational capital funds from the public to the private sectors of education.

This view has developed out of the recognition that the "financial crisis" in higher education is not a monolithic event and easily attributable to a single cause. Large, research-oriented universities are "in difficulty" because of recalcitrant legislatures no longer willing to provide the same per student real dollar subsidies; small private colleges, largely because of declines in the degree of "product differentiation" between their services and those of the growing state college systems hence in the willingness of their normal student clientele to pay the (possibly widening) tuition differentials between public and private colleges; and finally an industry-wide reduction in growth rates of the colleges' major clients, the population of college-age students.

It has been largely the private college and university which have embraced the PAYE Plan, and its most vociferous critics are those speaking for the public-subsidized institution. This drawing of battle lines is clearly little related to the conceptual merits of the PAYE Plan itself and is undoubtedly the product of this assymetry in the causes of financial difficulties between public and private schools. Many proponents of PAYE from the private college sector implicitly

assume that if PAYE were to be instituted on a large-scale by state governments it would be as a replacement for some portion of existing public grants to state colleges and universities. Critics, in turn, view it as part of a general reduction in the level of State tax aid to education and a shift in the burden of educational costs to the student.* Both appear to agree that it would sharply improve the private sector's relative competitive position at the expense of the public sector.

Associated with this, there appears to be some resistance to the PAYE Plan by financial aid people, in both public and private institutions, who view it as a threat to existing student subsidy levels. They often view it as part of the more general controversy of "grant versus loans," i.e., as a replacement for the increasingly heavy burden of grant aid. The danger with this association of PAYE with "grants versus loans" or with "public versus private" is that it will not be judged on its own merits. We see no obvious reason why it need be related to a general reduction in state or federal educational subsidies, and for any individual school it could be merely part of an expansion of loan aid (grant aid policy unchanged) or a substitution of PAYE loans for less desirable, college administered conventional loans.

4. Finally an equally reqrettable tendency by admissions offices to view the PAYE Plan largely as another weapon in their armory of weapons to compete for qualified applicants. While this approach may have some conceptual merit, it risks committing colleges to an unsound program merely for the sake of "keeping up with the Jones" or better, the Yales and the Dukes. If PAYE were attractive to the student, then the decision to initiate the program by one school would, as with so-called "monopolistic competitors" in industry, necessitate the adoption of the program everywhere whether financially sound or not. There is also a risk that the goals foreseen for the plan at the level of the individual school might be nationally inconsistent. For a national program to be "successful," we have argued, it must either attract more qualified applicants to education in general or maintain existing applicant and enrollment levels even as educational costs increase. While these goals could be accomplished in one school everything else constant, they might not be achievable nationwide. This is largely a warning that the experience of any one school utilizing PAYE, e.g. Yale and Duke, must be assessed in light of the reactions of other competing schools.

The Questions

Carleton is now considering a four-year "pilot" PAYE Plan of modest size ($250,000) or more precisely a pilot plan which if "successful" would be expanded into a full and on-going program after four years. The distinction between pilot and full program, we feel, is extremely important and the most pressing initial questions to be resolved are those relating to the optimal characteristics of the pilot plan itself.

1. Pilot Design. The pilot plan should be abstracted as much as possible from other financial policies, viz. decisions about comprehensive fee and the

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*Ohio's recent state PAYE proposal (the Gilligan Plan), for example, explicitly substitutes PAYE loans for state grants and would have reduced state aid to public universities by 4 per cent.

levels of student aid. Only after it were a demonstrated success should financial aid and tuitions policies be altered (perhaps in the direction of reduced student grant aid and more rapidly increased tuitions, if necessary) in conjunction with a full and on-going PAYE program. This would have the advantage, first, of permitting an assessment of the program independently of extraneous influences. Yale, for example, paired its PAYE Program with sharp increases in tuition charges and a declining relative amount of student aid. As a consequence, it will difficult for Yale to separate for analysis the "pure" effects of its PAYE Plan from the obscuring effects of these other influences. Second, this would have the advantage of avoiding any policy precommitments which might have to be altered if the Plan proved unsuccessful.

Thus, the pilot plan should be conceived of as a supplement to the existing student loan program. The fact that additional students could be induced to finance educational expenses via a PAYE Plan without major changes in grants or tuition policy should be evidence of a greater willingness to borrow given sharper rises in tuition and declines in the relative size of grants. As a slight modification it might also be conceived of as a replacement (in part) for the existing loan program, thereby permitting an assessment of the relative attractiveness of conventional and income contingent loans.

The pilot plan should also be designed to provide the maximum information possible for the assessment of its success at the least risk of financial loss to the college. While this may result in the appearance of arbitrariness which might itself generate resistance to the program, this can be defended (hopefully) fairly easily. The essence of any pilot program would be its modest size; Carleton would presumably want to limit the maximum size of its losses as well as the degree of possible illiquidity the plan might produce. All indications are, however, that there would be considerably more student interest in the program particularly in its first two years, than could be satisfied given its limited size. Some apparently arbitrary restrictions therefore, would probably be necessary, either on the maximum size of any individual loan or on the characteristics of the eligible borrower.

The arbitrariness of these restrictions, however, could be reduced if they are chosen on the basis of an easily defensible criterion and we would suggest as the simplest one that they be designed to generate maximum information at least cost to financial soundness. For example, one might consider lending only to freshmen or incoming freshmen in the first years of the program. This, unfortunately, would severly restrict the data available to assess the average borrower's future income profiles and the degree of adverse selection implicit in the program; the first repayments hence income information would begin only in the year after the decision to extend the program would have to be made. Lending exclusively to juniors and seniors and thereby generating at least three years of income and repayment information, on the other hand, would limit the data available to assess the plan's impact on admissions.

Other limits, a "needs test" or ceilings on loan size, would probably impair the plan's financial soundness and run counter to its most basic conceptual foundations. A needs test, for example, would probably produce some degree of "adverse," or better "special," selection. Limiting loans to the students with low family incomes or many siblings, in turn, would mean limiting repayments to a particular class of borrowers with income prospects that undoubtedly differ from the population as a whole. Indeed, there is some evidence provided by Becker[13] that

low parental incomes predict low student earnings quite successfully, i.e. a clear case of adverse selection. Moreover, even were the "selection" produced by a needs test not "adverse," one would still have to at least expect that income data generated from a pilot project with needs test would be an unreliable predictor of income profile for borrowers under the full program without a needs test.

A ceiling on individual loans would appear, at first glance, to be the most appropriate and most easily defended "arbitrary" limit. If one hundred borrowers expressed interest in borrowing $500 in the first year when a total of say $25,000, were available, then, the maximum loan granted would be $250. No arbitrary pre-selection would result under this plan except the obvious one of the plan's relative attractiveness to all. The income data generated under the plan would presumably closely approximate those of borrowers under the expanded program.

The difficulty here, however, would be in the costs of administering the program. Although never explicitly advanced as a hypothesis or tested empirically there is strong intuitive support of the notion that administrative costs would be more closely related to the number of applicants than to the total value of loans granted; a program of many small loans should have far higher costs of administration than one of similar total size with few borrowers. Yale, indeed, has placed a $500 floor on loan size for just this reason. Moreover, our questionnaire information suggests that the average loan request would be easily in the $500-$1,000 range and limits on size much below $500 no matter how "defensible" would undoubtedly generate resistance to the program.

In short, none of these limits would be completely desirable, and one might consider expanding the pilot project somewhat if student interest justified it rather than impose possibly harmful limits. The administration would have to assess the alternate value in the tradeoff that exists between the risks of large financial loss from a larger pilot project and the improved data or "informational" returns an expanded pilot plan might provide. In making that decision they should keep in mind the simple fact that the 25 borrowers resulting from a very modest $25,000 program (assuming all borrowed $1,000) would be hardly a sufficient sample on which to base a decision to extend or not to extend the program.

A final proviso relating to the pilot plan would be its relationship to plans in other schools. Ideally, the Carleton PAYE pilot should "compete" with as many other pilots as "full" plans that would be instituted after its success/failure had been established. This would avoid, as we suggested above, the undesirable competitive cross-effects mentioned in the last section. This is, of course, far too much to ask in practice, but it does argue for a continual sharing of information with other schools and care in the pilot's assessment that these cross-effects be taken into full consideration. There is some very casual evidence, for example, that the impact of Yale's Plan (and more importantly, its publicizing of Yale's financial difficulties) may have had an adverse effect on Yale admissions that would not have resulted were competing schools also utilizing the plan.

2. Attractiveness and Financial Assessment. The body of this paper will seek to expand on and answer a series of more basic questions suggested by this conceptual introduction through several computer simulations and a report of an initial questionnaire to the Carleton student body. We strongly emphasize that its conclusions are very incomplete and only suggestive. A pilot, we submit, is the only sure way to generate adequate predictions for the decision to institute a

full program. These questions can be grouped in the following general categories:

a. Utilization and Attractiveness. The success or failure of any PAYE Program must ultimately rise or fall on the individualistic criterion that it is attractive enough to both borrower and lender for a voluntary agreement to be reached: How many students would utilize it and what amounts would they request? Would its availability effect their decision to attend Carleton as opposed to other schools? To attend school at all?

What PAYE characteristics are most attractive to the student borrower? Income contingent repayments? The length of the repayment term? How much risk of internal subsidization will the average borrower be willing to expose himself to, i.e. how restrictive must the plan's exit provisions be to attract borrowers?

How much of the willingness to borrow under PAYE is the result of the unique, income contingent aspects of the plan and how much, due to Carleton's offering any kind of loan program on an unlimited, non-needs test basis? How much interest might be due merely to Carleton's actively soliciting rather than passively waiting for loan requests regardless of the loan's characteristics? Even if the borrower were initially indifferent to the income contingent aspects of the loan would the fact that these aspects reduced lender risk induce more active solicitation of such loans, hence more borrowing?

b. Income Prospects, Break-even Tax Rates and the Degree of Adverse Selection. What tax rates, given income prospects, borrowing costs, loan maturities, and the effects of exit provisions, will permit Carleton to break even? Since loan maturities, borrowing costs, and exit provisions are all to some extent under Carleton's control or subject to negotiation our major a priori task would be to assess borrower income prospects and this resolves into three subquestions:

If we assume that Carleton PAYE borrowers have exactly the same ex post distribution of income time profiles as past distributions (inflation, adjusted) for all earners who have attended four or more years of college, what tax rate will allow us to break even? This question can be answered very simply and quite precisely using census data on past incomes. It assumes, however, that past history would be repeated and that even if history were repeated, that Carleton borrowers would be chosen randomly from the same distribution of income profiles as in the college population as a whole.

Thus, we must also ask whether the effects on incomes of education, aging, inflation, and economy-wide productivity increases will be the same in the next 35 (20 or 10) years as they were for the recent past.

And, we must, finally, ask whether borrowers will self-select in such a way that their ex post income profiles differ significantly from all students. As we suggested above, this amounts to asking whether some students do have ex ante expectations about their future incomes and believe that the PAYE loan would be more costly than a conventional loan (given expectations of high incomes). It also amounts to asking whether these students' expectations bear some direct relation to realized, ex post earnings; i.e. the self-selections would be unambiguously adverse only if the high income expectations of students who selected out of the program were, in fact borne out later in actual incomes.

We submit, finally, that these last questions can never be answered in a

wholly satisfactory way without a pilot program. Indeed, a major goal of the pilot program would be to permit comparisons of the distribution of realized income profiles for borrowers with the distribution of past profiles for students as a whole (on which would be based the pilot's tax rates). To the extent borrower distributions were lower, for example, than in the population as a whole, tax rates would have to be readjusted upward in the full program, and one might contemplate a more limiting exit provision to attract more borrowers with "correct" (in an ex post sense) expectations of high earnings. Although at best only three years of income data would be generated by the pilot program, these should be very strong predictors for the remaining 32 years of repayments.

c. Liquidity. As we suggested above, this set of questions has many facets, very few of which are amenable to a priori analysis, particularly be academicians. We can do little to predict the marketability of the PAYE loan, the kinds of borrowing terms that might be obtained from a commercial bank or insurance company, or the short-run money market conditions that will govern fluctuations in the relationship between cash receipts and outflows. About all that can be done in answering these questions is to demonstrate the long-run viability of the program to interested lenders in the hope that this might alter favorably the borrowing terms.

There are, nevertheless, several questions specifically related to cash flows which we can deal with a priori. Assuming aside short-run fluctuations in the money market or income patterns and given tax rates, loan maturities, borrowing costs, and income prospects what kinds of debt profiles would result from our pilot project? Our full program? What would be the maximum of accumulated debt? The amount of interest payments? When would the accumulated debt of the pilot program be totally repaid? When with a full program would repayments be just equal to new loans? When would total repayments have paid off all accumulated debt?

We can also at least illustrate the effects of short-run fluctuations in money market conditions or income patterns. Should borrowing costs rise by, say two percentage points what would happen to our debt profiles? In the same way, what would be the effects of a drop in the rate of growth of borrower incomes by two percentage points? Do either of these demonstrations suggest anything about the optimum size of reserves earmarked against these eventualities?

Finally, can these debt profiles shed any light on the questions of how to design a pilot project? Lending exclusively to seniors to generate large early amounts of income data would probably reduce liquidity in the sense that accumulated debt would be larger and, paid off later. This is because, although senior repayments would begin almost immediately, these repayments would be based on lower incomes than earned by a similar group of freshman borrowers. Lending exclusively to the latter would mean the first repayments would be based on incomes which had been subject to three more years of inflation than the seniors. How significant would this effect be?

c. Administrative Costs. The most interesting question in this category concerns the validity of the above-mentioned hypothesis that a small program would be financially unsound because of (dis) economies of (small) large scale, in the administration function. Thus, we must ask whether there are reasons to believe that some administrative inputs come only in large lumps whose (fixed) costs would be lower, the larger the program they serve. For example, a single computer program would have to be designed and one lawyer (or collection agency)

retained regardless of the number of borrowers. The (fixed) costs per unit associated with these inputs would, obviously, be lower the larger the program.

We have also suggested that variable costs of administration would be more closely related to the number of borrowers than the total amount lent. Is the hypothesis valid? Does it justify some lower limit on loan size?

Finally, by how much must tax rates be adjusted upward to cover costs of administration (as well as borrowing costs)? Yale adds one percentage point to its (6 per cent) cost of borrowing to cover administrative costs. Is this valid? Can commercial bank experience with the administration of conventional loans suggest any answers to these questions?

Chapter I

UTILIZATION AND ATTRACTIVENESS:

RESULTS OF A CARLETON PAYE QUESTIONNAIRE

Purposes and Scope

This chapter is specifically concerned with recording and interpreting the data gathered via our PAYE Questionnaire (see Appendix). The primary purposes of this questionnaire were as follows:

1. To estimate the utilization of a possible PAYE plan by Carleton students.

2. To examine those characteristics of the responding students which are possible indicators of future income prospects; i.e., estimating the degree of adverse selection.

3. To evaluate the students' view of the (un) attractiveness of various features of the plan.

With these goals in mind, this chapter will first report the empirical findings of our research on these and related areas. The weaknesses and problems of our analysis will then be discussed and several conclusions and implications from our study will be mentioned and briefly defended.

Sample

A random sample of 400 Carleton students (100 from each class) received the questionnaire during May. We received 165 "legitimate" and completed questionnaires (a 41% return). Upperclassmen (juniors and seniors) and males returned questionnaires at a higher rate than underclassmen (sophomores and freshmen) and females. In each class, non-aid people returned more questionnaires than people who were receiving financial aid from Carleton. (See Appendix, Table #1)

Also at our disposal were 28 returns from a "test run" conducted in an introductory economics course. In an effort to preserve the randomness of the sample, this group of questionnaires has not been included in any of the following calculations. They were reserved solely for purposes of comparison with the "legitimate" group.

The Plan

The sample responded to the questions on the basis of a PAYE Plan described on pages 3-5 of the questionnaire. The summary mentions the following features:

1. 35 year maturity.

2. tax rate of 4/10 of 1 percent per $1000 borrowed (with a table showing what the annual payments would be at certain income levels).

3. a $500 to $1000 limitation on amounts borrowed.

4. availability to all students regardless of financial need.

5. an opt-out provision of 150% of the amount borrowed plus interest.

6. married persons repayments based on borrower's own income or one-half the couples' joint income, whichever is greater.

The summary then concluded by mentioning that while the plan had all the advantages of conventional borrowing, it had the unique feature of small variable repayments spread over a long period of time.

Utilization

One of the most obvious questions involved in the contemplation of a new program is "will anyone use it?" Two questions on page 5 of the questionnaire were designed to estimate the degree of student interest in the proposed program: 1) Would you have used the plan last fall to finance the $250 increase in comprehensive fee? (referred to hereafter as #1a), and 2) Would you use it next year if the comprehensive fee was increased $300 and Carleton financial assistance remained constant? (referred to hereafter as #2a).

We received significant favorable responses to both questions. In fact, close to 20% of both groups indicated that they would "definitely" use (have used) the plan. Assuming that our returns are random and accurately portray the sentiments of the Carleton student body and that the answers received on these returns are indicative of actual action on the student's part (large assumptions), approximately 290 Carleton students would be likely to take part in a PAYE plan.

As we suggested in the Introduction, this would pose the first, practical question of pilot design. If the first year pilot program were limited to $25,000, each interested student could defer less than one hundred dollars. A response as large as the questionnaires indicated would therefore necessitate some form of rationing of scarce funds, and whatever the rationing criteria employed, this may have undesirable effects on the ex post distribution of borrower incomes (adverse selection), administrative costs and the informational feedback of the program.

All that can be concluded in this section is that Carleton students will utilize the plan. Whether they are contrasting and comparing it with a conventional commercial bank loan or viewing it simply as the only available loan source is another problem. We know only that they will use the program. We are not sure why they want to use it nor, necessarily, are they.

Last Fall (#1a)

Freshmen could not meaningfully respond to #1a because last year's comprehensive fee is the only one they have ever known. Freshmen were therefore eliminated from this group of respondents and associated computations.

On a scale of -2 (definitely not use) to +2 (definitely use), the following is a composite breakdown of Group #1a (seniors, juniors and sophomores) responses to question #1a:

Table A

Responses to Question #1a

	-2	-1	0	1	2	Total
Number	47	13	27	21	25	133
%	35.3	9.8	20.3	15.8	18.8	100

Thus over one third of the respondents indicated that they would have been likely to utilize the plan last fall. Sophomores gave the highest percentage of positive responses--but these answers were mostly of a "lukewarm" (-1) nature. Juniors expressed the most enthusiasm (+2) for the plan. There was no discernable difference in the responses of the two sexes (See Appendix, Table #2).

Financial aid status did produce considerable differences in response. Those not receiving any form of Carleton financial aid were far less enthusiastic about the plan than those who were on aid. This result is not surprising. If a student's parents (or any other source of funds with effectively "zero" cost to the student) can finance increases in the cost of his education, it seems reasonable that the student would not be eager to assume any kind of debt. It is interesting, however, that more than 20% of those people who do not receive financial aid still expressed interest in, i.e. gave a positive response for using the plan.

A student's financial aid status is directly linked (via the Parents' Confidential Statement) to his family's income. The above paragraph thus implies that the plan appeals more to those families with lower annual income. If family income is positively correlated with future income propects, the plan could suffer some "adverse selection" with regard to this factor. Admittedly the data we have is quite incomplete, but it does tend here to support the "adverse selection hypothesis."

Next Fall (#2a)

Question #2a was not applicable to seniors and they were deleted from consideration in Group #2a. With freshmen included and the question now phrased in the future tense, the composite response looks like the table below.

Question #2a elicited more favorable responses than Question #1a. There are a variety of possible reasons for the increased interest in using the PAYE plan demonstrated by Group #2a. Freshmen appear more interested in the program than seniors. Both sophomores and juniors also expressed increased interest in the plan when it was related to future tuition payments. It seems possible that people have learned to "live with" their present financial package during the year --but when they contemplate next year and/or futher comprehensive fee increases, they more readily consider new sources.

Unlike Group #1a, females in #2a are less interested in the plan than males.

Table B

Responses to Question #2a

	-2	-1	0	+1	+2	Total
Number	28	16	20	27	28	119
%	23.5	13.4	16.8	22.7	23.5	100

Non-aid people are still less enthusiastic than aid people--but the percentage of non-aid people who expressed interest in using the program jumped from 20 percent to 33 percent. (See Appendix, Table #3)

Adverse Selection

"Adverse selection" is fundamentally the hypothesis that because PAYE plan repayments are income contingent, people with high income prospects will be less likely to utilize the plan than their less able (or confident?) peers. Fear of "adverse selection" has resulted in various "opt-out clauses" to make the plan less ominous to those anticipating high income. Our questionnaire and the data it generated were based on a PAYE Plan with opt-out option of repaying 150% of the principal plus accumulated interest.

Whether people attracted to the plan actually earn less than their non-using peers is the relevant question for determininig the appropriate break-even tax rate. How closely the expected earnings of the students respond to ex post earnings is a question far beyond the scope of this work. The questionnaire could only isolate and record a few possible indicators of future income (sex, major field, GPA, and family income). It also asked students point-blank what their income expectations are for the first five earning years and their peak earning year.

Our analysis indicates that adverse selection exists, if at all, only to a limited extent. This conclusion is based of course, on the premise that the funds would be made available to a random group of Carleton students. Should it be necessary to ration the limited funds, the standards chosen for eligibility (financial "need"?) could considerably alter ex post income distributions as well as the degree of adverse selection from which the applicant pool would suffer.

Sex. For a variety of reasons, females tend to earn less than their equally educated male counterparts. On this count, they should see an income contingent loan as a "good deal". On the other hand, the fact that they will be expected to pay back the loan on the basis of one-half of the combined family income should they marry, mitigates against women utilizing such a plan. Girls presumably do not want to carry a "negative dowry" into any marriage.

The questionnaire results appear to give a fairly clear-cut answer to these

hypotheses. Those girls who returned a questionnaire were, as noted in the section above on Utilization, equally or somewhat less enthusiastic about the plan than their male counterparts. On this basis alone we can conclude that there is no adverse selection by sex; indeed, "selection" by sex would appear to be "favorable" to the extent (low earning) females are not interested in the plan. In short, the "negative dowry effect" would appear to outweigh the "good deal effect" for females.

At first glance, the conclusion might appear to be qualified by the fact that far fewer questionnaires were filled out and returned by girls than by boys (three male returns for each girl return). (See Appendix, Tables 2 and 3) The question would then arise whether the larger number of girl non-returnees differred in interest from their male counterparts. However, the smaller number of female returns resulted simply from the fact that our "random" sample (chosen by computer) included many more boys than girls. Of those girls who actually received a questionnaire, exactly the same proportion (41 percent) as boys filled it out and returned it.

Majors. Social science students are the academic group most interested in utilizing the plan. Physical science majors are the least likely. The figures are certainly not conclusive, but if the currently less favorable income prospects for social science graduates (as compared to that for physical science graduates) persist the plan would suffer from some adverse selection due to major field. (See Appendix, Table 4)

It is interesting to speculate on the reason for this differential (by field) in student interest. The social science major's enthusiasm for the plan (or the physical science major's lack thereof) is not necessarily closely related to income prospects. A possible alternative hypothesis is that social scientists are dealing with a new proposal that is closer to their major field of study than are physical science people. Understanding the fundamentals and mechanics of the new idea could be a major factor in acceptance of the program. A comprehensive PAYE "education" could probably increase physical science students' understanding and willingness to accept the plan and thereby the plan's adverse selection.

Grade Point Average (GPA). Although the reader is invited to make his own evaluation of the predictive value of a person's reported GPA for future earnings, we feel it is a somewhat dubious indicator. If high grades at Carleton are associated with high income levels, however, a PAYE plan may very well be subject to a certain degree of adverse selection by GPA. The mean GPA of those favoring the PAYE loan was slightly lower than that of their less enthusiastic counterparts (See Appendix, Table 5).

Family Income. Family income is evidently a very sensitive matter for Carleton students. Only 14% of Group #2a cared to give an estimate of this figure on an anonymous questionnaire. Nevertheless, these few responses show a very close correlation between positive interest in the plan and lower reported family incomes (See Appendix, Table 6). Moreover, this result is strongly supported by the sharply increased interest in the plan by those on financial aid reported above (see Utilization). Abstracting from number of siblings, financial aid status is presumably very closely related to lower family incomes. This, we feel, is the most clear-cut case of pre-measured adverse selection and the strongest argument against any "needs test rationing" of pilot funds. Whatever "natural" adverse selection we have found here via questionnaire could only be strengthened by a needs test in an actual program.

The poor response to this question unfortunately precluded testing another interesting hypothesis: any self-selection on utilization by sex, GPA, or major is obscured by family income differentials in these groups. The reason for the relatively unfavorable female response, for example, might have been a greater number of high income, female respondents. Using aid/non-aid status as a proxy for family income, however, we found that girls did not significantly differ from boys in aid status (hence, presumably, family income). It was, presumably, sex alone that determined the less positive female response.

Earnings Expectations. Unfortunately (or is it honestly?), Carleton students don't know or don't care to divulge what they anticipate earning. What estimates were made on the questionnaire were frequently qualified with expressions of self-professed ignorance. Assuming that status rather than absolute dollar amounts is the motivating force for Carleton students, a more useful question to have asked would have been "Do you expect to earn more or less than the average member of your class?" With this question, comparative earning prospects could have easily been correlated with enthusiasm for the PAYE plan.

For the record, students who do like the PAYE idea do expect to earn a little less than their "disliking" counterpart--both during the first five years and their peak year. (See Appendix, Table 7)

Attractiveness

Two questions atop page 6 (2c and 3) were designed to estimate student feelings about various features of the plan and to measure the attractiveness of the plan vis-a-vis other possible sources of funds. Question 2c asked the respondent to rank in order of attractiveness the sources of funds he would look for in response to a comprehensive fee increase. Question 3 specifically asked the students to rate on a -2 to +2 scale six features of the plan.

Consistent with our findings under Utilization, the responses to 2c indicated that the PAYE plan rated a high position on the students' preference scale. Question 3 indicated that the students liked all features of the plan and were especially enthusiastic about helping a younger sibling through college and having the size of annual repayments based on income.

Features. Each feature mentioned in question 3 received a majority of favorable (positive) ratings. Helping a young sibling through college (f) was the most highly rated feature or advantage (of course, who could be against that?). That the size of the loan repayments were not fixed but based on earnings (d) was a very close second. Both factors received positive ratings from 85% of the responding sample of 165. The size of the annual repayments (b), the fact that the availability of loan funds was unrelated to need (d) and freedom from parental influence (e) all received favorable ratings by a little over 75% of the respondents.

The length of repayment period (a) received by far the poorest relative rating, although slightly over 50% of the respondents gave it a positive rating. This phenomenon can be in large measure accounted for by the people who like everything about the plan (and knew nothing?). Some people, however, noted that they would not use the plan because of the exceptional length of the repayment period (35 years). In fact, the most frequent comment at the end of the questionnaire was an often quite vehement expression of fear and distrust of long-term debt.

Three of the six features mentioned in the questionnaire are unique to the PAYE loan: the great length of the repayment, the relatively small size of annual repayments, and the income contingent basis for repayments. Three features are to some extent shared with conventional borrowing: the freedom it offers from parental influence, the possibility it provides to help a young sibling through college, and (at least potentially) availability unrelated to need. This last feature, however, does not fully characterize commercial bank educational lending. As we mentioned in the Introduction, there are many imperfections in the educational loan market, i.e. a lack of information and often rationing according to "need" or other criteria besides willingness to pay a "going" interest rate. This study suggests that Carleton students are attracted by the advantages of any borrowing as long as they are made aware of it and the funds are easily obtainable and unrelated to need. They are, however, also quite taken by income contingent repayments--a feature not available with conventional loans.

The other two unique features of the PAYE loan presented in the questionnaire (the long period of repayment and the relatively small size of repayments) are naturally interrelated; i.e. it is the long period of repayment that makes possible the small size of each annual repayment. The far less favorable response to the PAYE loan's long maturity suggest that the PAYE plan presented in the questionnaire would not be unambiguously preferred to other borrowing if both were equally as easily available. However, this source of unattractiveness could probably be corrected by offering a range of long-short maturities with appropriately corrected low-high annual payments and by making an educational effort to acquaint the borrower with the trade-off between loan maturities and annual repayments (See Appendix, Table 8).

Ranking of Sources. Question 2c asked students to rank according to desirability the various sources of funds they could look for in the event of a tuition increase. The PAYE plan, as it was described in the questionnaire, received more first choice votes than any other alternative. Family contributions received the most total votes and was a close second to PAYE in number of first place votes. On the basis of a strong showing in the second and third choice positions, summer work finished second to family contribution in total votes.

These figures seem to indicate that people will first turn to their family and then to summer work when they need additional funds for their education. Many people however, would be willing to utilize a PAYE plan before either of these sources if it were available. It is interesting to note that the PAYE plan mentioned ranks well ahead of a standard Carleton loan and a Carleton work contract. (See Appendix, Table 9)

Miscellaneous Information

Several factors and reactions were recorded in the questionnaire that are not directly relevant to utilization, attractiveness or adverse selection. Some of this information may nevertheless prove useful in consideration of the various facets of the PAYE plan.

Commercial Bank Borrowing. There is a dearth of knowledge concerning the amount to which commercial bank borrowing is utilized by Carleton students. Although the following data hardly begins to fill this void, it does provide a basis for some interesting speculation as to the reason for the PAYE plan's attractiveness to

Carleton students. It is our position that if any Carleton loan program could overcome the barriers of imperfect knowledge in the student loan market it would probably be considered attractive and would be utilized even without the features that differentiate it from conventional commercial bank loans.

Only 29 (18%) of the 165 legitimate sample have ever even considered commercial borrowing. Only 12 (7%) have actually borrowed. Most of those who have considered borrowing or have borrowed are either 1) those who favor the PAYE plan or 2) seniors. When asked (in question 4c) for the reason they considered or secured a commercial bank loan, most respondents indicated the rather broad "insufficient funds from other sources" explanation. (See Appendix, Table 10)

It is of considerable interest that so many students declare that they would definitely utilize PAYE plan and yet have never even considered obtaining a commercial bank loan. An obvious theoretical inference from these facts is that the features of a PAYE loan are so much more attractive than its commercial bank counterpart that Carleton students are willing to contemplate and accept it--> but not a commercial bank loan.

There is an alternate possibility. A considerable lack of knowledge seems to exist on the part of students concerning commercial bank loans, i.e. how and where and when they can be obtained, at what interest rate, how students can qualify and what they can do with the money. Also, commercial banks certainly have not gone far out of their way to inform students of the possibilities of using these funds. Commercial banks frequently ration these funds among applicants (usually providing them only to its own customers). Therefore it is not at all clear whether the favorable ratings given the PAYE Plan were due to its specific features (income contingency), and small payments over a long period of time) or due to its ability to overcome the imperfect knowledge and market imperfections involved in student loans by an active solicitation of student interest by the lender.

Part (d) of question 4 asked who the student would consider responsible for repayment of an educational loan: the student alone, the student and his parents or the student's parents alone. The responses indicate that the people who would be likely to obtain a PAYE loan consider themselves more responsible for their educational debts than their disinterested peers.

Alternative Choice of Action. The latter part of question 1 on page 2 sought to determine what students who receive financial aid (non-aiders are excluded) would have done had they not come to Carleton. This somewhat "backhand" survey seems to tangentially support the intuitive hypothesis that we lose our students to both state and private colleges with LOWER net costs. Over 60 percent of the respondents would either have not attended college at all or have gone to schools with lower net costs were Carleton financial aid unavailable. Surprisingly, however, Carleton appeals to a group of students with very strong preferences for the private college. The "cheaper" but high quality state university is not the "next best alternative" to Carleton. Rather, it is the less expensive, private college. (See Appendix, Table 11)

It might also have been useful to classify the respondents' choice on the basis of family income (assuming it is the "middle income" student we are concerned with attracting and keeping at Carleton) but insufficient family income data was available for such a classification.

It is, of course, incongruous to ask people who decided to come here what their second choice of action was in an effort to determine to what kind of institution we are losing applicants. We should, of course, ask the people we actually lose to obtain this information.

Siblings. No obvious correlation between number of siblings, their age and attendance at college could be made with regard to student utilization of a PAYE plan. (See Appendix, Table 12)

Off-Campus Study. About 45% of the legitimate sample expressed interest in financing an off-campus study program with the PAYE plan described. Not surprisingly, the same people who would use PAYE for comprehensive fee payments would be the most likely to use it for off-campus study. (See Appendix, Table 13)

Reaction to General Availability. Very few people expressed strong opposition to the plan's mere existance on the Carleton campus. In fact, even those who did not foresee ever having any need to utilize the plan were quite enthusiastic about having it available for those who needed and/or wanted to use it. It is not clear whether this sentiment dominated because the students were convinced that the plan was a good idea that would make Carleton a better and more attractive institution--or because its existence would not affect them in any way. (See Appendix, Table 14)

Parental Reaction. Over 60% of those who cared to estimate their parents' reaction to the PAYE plan's availability (in response to the final question) claimed that their parents would receive it favorably. There was a positive correlation between the student's opinion of the plan and the opinion he credited his parents with harboring. However, before any meaningful measure of parental sentiment can be attempted parents should have the program explained to them and polled directly. (See Appendix, Table 15)

Considering that a PAYE loan is strictly the student's responsibility, it is possible that parental opinions would have little impact on students' decisions to utilize the plan. However, since many students rely heavily on their parents for financial advice (as well as assistance), the parents' view of the plan might well be a decisive factor in the amount of utilization the plan enjoys. Specifically, it is possible to foresee a situation where a student's parents would "encourage" him to utilize what appears to be a "good deal" which at the same time lessens the financial strain on them. However, in the absence of PAYE these same parents would probably not decrease their support if that action meant that their child could not attend school.

Analysis' Weaknesses

All analyses of "reality" depend on some model of that reality. The strength (or weakness) of the analysis depends upon how closely that model approximates the reality being studied. In the case of this study, we are not certain that the returns received were truly random and indicative of the Carleton student body or that the recorded responses are accurate indicators of future actions. This section will discuss the validity of our sample and the reliability of that sample's responses.

Preselection of Returnees. With a return of less than 50%, the question of

who chose to return the questionnaire naturally arises. Were those with a desire to use the program more likely to complete and return the questionnaire than those who were not interested in the program? If this is the case, then the eagerness of Carleton students to use the plan indicated by the responses we received would be misleadingly high.

A comparison of the legitimate group and a non-random sample lends some support to this hypothesis:

Table C

Comparison Group Responses--Question #2a

	-2	-1	0	+1	+2	Total
Number	14	2	3	5	4	28
%	50	7	11	18	14	100

The comparison group consisted of 28 members of an introductory economics class. These students were a "captive sample" in that the questionnaire was passed out at the beginning of the class session and everyone was requested to return it.

The decrease in enthusiasm for the plan shown by the comparison group could be attributed to many causes. One, of course, is that with any preselection eliminated by a guaranteed full return, a more accurate reading of the Carleton student's disinterest is obtained. Alternatively, however, this sample differs dramatically from the original cross sectional random sample in that it is predominantly freshman and male (although the comparison group is still less likely to use the plan than either of these groups). The people in the group were also playing the role of "economics student" and could possibly have been trying harder than their "legitimate" peers to use economic analysis to criticize the plan.

The comparison group also had fewer people on financial aid than the legitimate group and reported higher family incomes. Their lack of enthusiasm for the plan, could be attributed to both these forms of adverse selection.

Hypothetical Nature of the Questionnaire. The strongest and most valid charge levelled against this research is that it is a very hypothetical nature. It asks people what they would do under certain circumstances--not what they did or how they do feel. The subjective nature of the questions results in considerable confusion in interpreting the meaning of the answers; i.e. what circumstances are the students assuming when they make their responses. Also, as has been noted elsewhere, stating that one WOULD do something is hardly the same thing as ACTUALLY doing it.

There is no real defense against this charge. There seemed to be no way to make these results empirically "hard" short of a pilot program. Any interpretation

of these results therefore, must recognize that the questions to be answered were all of a hypothetical nature: Would students use a PAYE plan? What would they find attractive and unattractive about the plan? Who would use it? Lacking sophisticated questionnaire techniques and the ability to conduct "in-depth" interviews, we could only ask our questions as simply as possible and hope that the recipient responded in a fashion indicative of future action.

Question #2a on page 5 (the one that referred to a tuition increase next year) was the question used to tabulate the results throughout this survey because it seemed that this group (freshmen, sophomores and juniors) and this time period (next year) are the ones we are ultimately concerned with. Our attitude was that if a hypothetical question need be asked, asking it retrospectively is far worse than prospectively. It is regrettable, however, that the question couldn't have simply read "Would you use this PAYE plan if it were available next fall?"--without the tuition increase notion that does little but confuse the issue.

A minor point of additional discrepancy is that the plan that was simplistically described in the questionnaire was cribbed directly from the program that Yale is putting into effect. Our results might change if the plan was modified by the inclusion of one or more of several different variations. We believe, however, that students were responding to the basic ideas of a PAYE plan, and while it cannot be denied that changes in the various features (opt-out provisions, repayment rates, maturity periods) would make the plan more or less attractive, it is doubtful that such changes would result in a drastic shift in the degree of expected utilization.

A final problem is that the wording used to describe the PAYE plan in the questionnaire could have prejudged some of the results. For instance, when we discuss the unique features of the PAYE plan in the summary (page 5), we term them "special advantages." One of the special advantages being referred to is the "income contingent" aspect of the loan. This feature is definitely an advantage in that it lessens the risk of having a burdensome fixed debt and a low annual income. On the other hand, in exchange for this advantage the borrower agrees to accept the possibility of paying effective interest rates in excess of conventional loans. Should a borrower enjoy higher than average income, he will pay the "special cost" of an income contingent loan. The "special cost possiblity" was never explicitly spelled out in the summary.

It is regrettable that the phrase "special advantage" was allowed to reach the final draft of the questionnaire (much less be underlined!) How much effect our inadvertant "hard sell" had on the responses of the students will be left to the judgment of the reader.

Conclusions

1) Carleton students have a definite need for loanable funds. Any program offering such funds would be utilized. The mere fact that this source of funds would be available within the student's knowledge and without regard to "demonstrable financial need" would be sufficient to assure any loan plan's utilization. If the present student commercial bank loan market was less imperfect, however the demand for a college loan service would undoubtedly be less.

2) The various features of the described PAYE plan interest Carleton students

and are generally viewed as attractive. A thoroughly descriptive pamphlet describing the particulars of a "Carleton plan" would ease some of the apprehensiveness and confusion about the idea for many students and increase the number of people who would want to use the program.

As noted above, however, it is not only the specific and unique features of a PAYE plan (income contingency, mutualization of risk, low premiums and long maturities) that inspire student demand. The decision as to the form of any additional Carleton loan program (PAYE vs. conventional) should depend on the demonstrable advantages of one form over the other both to the institution and to the student. This study did not deal with the institution's point of view—only the student's. Because a great deal of enthusiasm was expressed for the income contingent nature of the loan (see Attractiveness) and because a PAYE loan was preferred even to a subsidized Carleton Loan, we conclude that a PAYE plan is superior to a conventional loan from the student's point of view.

3) The feature of the described plan that inspired the most "outrage" was the length of repayment period (35 years). No one vehemently opposed the tax rate proposed (.4%). It is impossible to determine the exact trade-offs in the students' minds between a higher premium or tax rate and a shorter maturity. As a first approximation, however, it seems reasonable that the premium rate should be raised and the maturity shortened or that a range of maturities tax rates, be offered.

4) The opt-out provision of 150% plus accumulated interest also discouraged several students. Many of them failed to recognize that this provision is a ceiling designed to protect (and lure) people with high income prospects. Rather, they simply felt that the possibility of paying 150% of the principal of a loan plus accumulated interest was simply "too much" to pay on any loan.

If any opt-out provision is deemed necessary to insure an adequate cross-section of users, it is recommended that the opt-out be stated as a "penalty rate of interest" (a la a mortgage) on an individual basis; e.g. a user would be relieved of his obligation when his total repayments equalled the principal plus accumulated interest at (say) 12% (a penalty rate). This penalty rate of interest could be set to effectively approximate any opt-out provision (even 150% of principal plus accumulated interest at 7%). It is only a different way of conceptualizing opt-out. The advantage is that students will be happier borrowing with it than a Yale-type opt out. They find a penalty rate more easily understood, more easily compared and more easily accepted; e.g. 12% on a loan isn't "too much", while 150% of principal plus 7% interest is.

5) Although many people expressed interest and even enthusiasm for the program, a considerable lack of comprehension and confusion was apparent. Before some people would be willing to actually use the plan, certain features and advantages would have to be clearly explained. On the other hand, complete knowledge could very well "scare-off" several potential users. Regardless of its effect on demand for the program, such an "eudcational" program would lessen post-facto ill-will (and its effect on alumni giving). If the program is to work it is important that everyone know exactly what they are getting involved in (interest rates, risks, options, advantages, disadvantages, etc.).

For the program to overcome the initial hesitance of students and keep its users happy, more will be needed than a note in a P. O. box followed by 35 years

of computerized bills. As a start, a Yale-like brochure should be compiled and distributed and meetings held to explain the various facets of the final plan to any interested students.

6) Many respondents commented that the ceiling on the amount that could be borrowed ($1000) was too low. Given the limitations of a pilot project, this complaint is unremediable. One thousand dollars, however, does not provide students freedom from their parents. Given the right circumstances, the ceiling should be raised. On the other hand, it is initially important to spread the limited funds among as many people as it is administratively feasible. Such large numbers are necessary for adequate information feedback and an adequate cross section of income earnings.

7) The extent of adverse selection cannot be known at least until the results of the pilot program are known. It is important, however, that the danger of adverse selection be recognized in any attempt to ration the limited funds. Limiting loans to those people already on financial aid for instance, or in certain fields of study, could prejudge any test.

Chapter II

INCOME PROSPECTS AND THE BREAK-EVEN TAX RATE

As we suggested in the Introduction, the estimation of breakeven tax rates (per $1000 borrowed) is a simple task and capable of some considerable precision if certain very restrictive assumptions are accepted. These assumptions in brief were again: 1) that Carleton PAYE borrowers would have a distribution of ex post income profiles exactly the same as the distribution of profiles for all individuals with four or more years of college education in the population as a whole and 2) that past distributions for the population as a whole (from census data) can be expected to be repeated (account taken of inflation and productivity increases) during the next 10, 20, 30, or 35 years.

As a first approximation, we will calculate our tax rates given these initial assumptions. We will also avoid the complication of an exit provision. This amounts to assuming that no adverse selection would develop in the absence of exit provisions and that they are not needed to induce potential borrowers with high income expectations to remain in the program. We must emphasize strongly that these assumptions will undoubtedly not be borne out in practice and that our calculated breakeven tax rates will be correspondingly subject to error.

In an effort to analyse our errors we will then relax these restrictive assumptions, discussing possible divergences of borrower income distributions from population-wide distributions, considering potential discontinuities in the economy's general motion between the recent past and the near future and adding an opt-out provision. We hope these discussions would at least establish the direction of our errors if not their actual magnitudes. We again emphasize, however, that such a priori theorizing can never be more than suggestive. A major task of the pilot program would be to generate the actuarial data we lack and to verify or reject these initial assumptions.

Calculated Breakeven Tax Rates and Basic Methodology

The breakeven tax rates obviously depend on three crucial variables: 1) the costs of borrowing plus administration, 2) the maturity of the PAYE loan, and 3) most importantly, the income prospects of the average borrowers. The last, we feel, can be at least conceptually subdivided into two sub-components: 3a) growth in the average borrower's income due to simple aging and 3b) growth due to change in the economic environment. The first type of growth (aging or seniority increases in money income) is that growth which would take place if borrowers were to merely grow older in an economic environment which was in some sense static. Fairly hard data is available from census reports (see section below on Income Prospects in Detail) to measure the influence of this factor. In addition to the effects of aging, however, borrowers' incomes are increased each year due to changes in the economic environment. More precisely, money incomes grow, independently of aging, due to inflation and increases in labor productivity. Historically, these factors have produced rates of increase in per capita money incomes of 3.5 to 5.5 percent annually. Thus, even if an individual were to remain eternally only 25 years old his income would be expected to grow at roughly 4.5 percent annually.

We have also chosen to allow loan maturities and borrowing costs plus costs of administration to vary. While borrowing costs will be "fixed" as soon as initial financing of the pilot program can be negotiated, it may still be informative to consider a range of such costs in this a priori analysis. Moreover, short term borrowing costs may change with changes in money conditions, and we may wish to consider corresponding changes in breakeven tax rates. We have also chosen to allow loan maturities to vary because of the apparent diversity (see Chapter I) in borrower attitudes toward the trade-off between longer maturities and higher annual dollar payments. There seems no apparent harm in offering students a set of loan packages featuring either high annual payments (a high tax rate) and a short maturity or lower annual payments but a long exposure to the loan obligation. Moreover, there is strong intuitive support for the hypothesis that there would be undesirable cross-effects between PAYE repayments and alumni giving. Shortening average maturities by offering borrowers a range of maturities may help reduce these cross-effects.

Given these data and assumed values for our three variables, computation of breakeven tax rates is merely a mechanical process. In very simple terms, it amounts to asking what tax rate, given income prospects and loan maturities, will provide us with the same dollar return as a $1000 deposit in a bank account of the same maturity compounding at a rate equal to our borrowing costs. Or more formally, we are asking what tax rate (again, with income prospects, maturities, and borrowing costs specified) will equate the present value of the expected flows of student repayments with the cost to Carleton of this instrument, i.e. $1000.

As a minor complication we have also introduced the problem of three years of deferred payments. We are assuming here that our average borrower is a senior who receives his $1000 loan in the fall of his senior year (1971) and does not begin repayments until three years after that date. Since repayments are based on the previous year's income as recorded in the individual's income tax return and since the borrower will have earned only six months of income in the first tax year (June-December) following graduation, the lender must "wait" until two years after graduation (1974) before repayments based on the first full year's income (1973) could be made. This means that Carleton would effectively provide the student three years of interest-free financing, and to correct for this we must discount the first year's repayment at a higher rate than if the repayment were made immediately. It also means, however, that the income on which the first repayment is based will have been subject to two more years of economy-wide money income growth. As we shall discuss below, this income growth effect can more than offset the delay effect.

Mathematically, then, we are solving for t in the following equation:

$$\$1{,}000 = PV = \frac{t\,Y_2\,(1+g)^2}{(1+r)^3} + \frac{t\,Y_2\,(1+g)^3}{(1+r)^4} + \ldots + \frac{tY_n\,(1+g)^{n+1}}{(1+r)^{n+2}}$$

where

PV = present value

t = tax rate per $1000 borrowed

$Y_1 \ldots Y_n$ = the age income profile, i.e. the effect of aging (from Census Bureau data)

g = growth rates in per capita money income, i.e. changes in the "economic environment"

r = borrowing costs or "Interest Rate"

n = the loan's maturity

The following tables present the results of our "first approximation" calculations of breakeven tax rates. In each "cell" can be found that tax rate (the proportion of income to be paid per $1000 borrowed) which will allow Carleton to just cover its borrowing costs plus costs f administration ("INTEREST RATE") depending on two other variables: the maturity of the loan ("N") and the rate of growth in borrower incomes due to economy-wide increases in money incomes ("G") i.e. changes in the economic environment. Thus, in Table I.c., if the borrower chose to repay his loan in 20 years, if our costs of borrowing plus administration were 7 per cent (the 6 per cent prime rate plus a 1 percent adjustment for costs of administration), and if we assumed that economic growth would generate a 4.5 percent annual increase in money incomes during the next 20 years, then we must charge each borrower seven and one half tenths of one percent (.0075) of his income per $1000 borrowed each year to break even. Put slightly differently, were we to charge this tax rate for 20 years (assuming the same 4.5 percent increase in money incomes) then, our yield for each $1000 lent would be a quite acceptable 7 percent.

Table I

Calculated Breakeven Tax Rates

INTEREST RATE = 0.060

a

	G=0.035	G=0.040	G=0.045	G=0.050	G=0.055
N= 10	0.0169	0.0164	0.0159	0.0153	0.0148
N= 20	0.0074	0.0070	0.0066	0.0062	0.0058
N= 30	0.0048	0.0044	0.0040	0.0037	0.0034
N= 35	0.0041	0.0038	0.0034	0.0031	0.0028

INTEREST RATE = 0.065

b

	G=0.035	G=0.040	G=0.045	G=0.050	G=0.055
N= 10	0.0176	0.0170	0.0165	0.0159	0.0154
N= 20	0.0079	0.0074	0.0070	0.0066	0.0062
N= 30	0.0052	0.0048	0.0044	0.0041	0.0037
N= 35	0.0046	0.0042	0.0038	0.0034	0.0031

INTEREST RATE = 0.070

c

	G=0.035	G=0.040	G=0.045	G=0.050	G=0.055
N= 10	0.0183	0.0177	0.0171	0.0165	0.0160
N= 20	0.0084	0.0079	0.0075	0.0070	0.0066
N= 30	0.0057	0.0052	0.0048	0.0044	0.0041
N= 35	0.0050	0.0046	0.0042	0.0038	0.0034

INTEREST RATE = 0.075 d

	G=0.035	G=0.040	G=0.045	G=0.050	G=0.055
N= 10	0.0189	0.0183	0.0177	0.0171	0.0166
N= 20	0.0089	0.0084	0.0080	0.0075	0.0071
N= 30	0.0062	0.0057	0.0053	0.0048	0.0045
N= 35	0.0055	0.0050	0.0046	0.0042	0.0038

INTEREST RATE = 0.080 e

	G=0.035	G=0.040	G=0.045	G=0.045	G=0.055
N= 10	0.0196	0.0190	0.0184	0.0174	0.0172
N= 20	0.0095	0.0089	0.0084	0.0080	0.0075
N= 30	0.0067	0.0062	0.0057	0.0053	0.0049
N= 35	0.0060	0.0055	0.0050	0.0046	0.0042

Subject, then to our above mentioned caveats, we feel we can predict breakeven tax rates with some reasonable measure of confidence. As we will discuss below (again, see Income Prospects in Detail) the most likely estimate for the economy-wide annual rate of growth in per capita money incomes ("G") is 4.5 percent. Therefore, if Carleton succeeds in financing its PAYE program at the 6 percent prime rate and chooses to cover its administrative costs by adding a percentage point as the cost of administration (Interest Rate = .07) then borrower income prospects should permit breakeven tax rates of .0042, .0048, .0075, and .0171 for loan maturities of 35, 30, 20 and 10 years respectively (see third column in Table I.c). These figures are heartening in that they bear a very close relation to tax rates charged by the only ongoing PAYE programs at Yale and Duke and to those suggested by other a priori studies of this kind.[14]

Before turning to a more detailed analysis of income prospects we should emphasize again that the term "breakeven tax rates" obscures the crucial problem of liquidity. To be sure, we are predicting that Carleton would ultimately break even utilizing these tax rates. However, it would not be before 20-25 years in a four-year pilot program or before many years in an on-going program that all accumulated debt would be paid off. We shall postpone discussion of this problem until the next chapter on Liquidity.

Income Prospects in Detail

A failing of many past analyses of the PAYE program has been a neglect of the detailed specification of income prospects. This task is probably as important if not more so than the calculation of breakeven tax rates. Inappropriate tax rates can always be changed with the approach of an on-going program. However, such changes depend on how actual borrower incomes and repayments behave in contrast to those assumed initially under the heading of "income prospects". It is therefore very important to specify these predicted future flows in detail in order to provide a benchmark for later evaluation of the pilot program.

The Age Income Profile. At the base of our predictions is the so-called Age Income Profile or what Bowen calls the "no-growth income" profile.[15] This was embedded mathematically in our computing formula as the series of numbers expressed by the symbol: $Y_1 \ldots Y_n$. The age-income profile shows the average earnings of all individuals with four or more years of college education today (1971) at each age level, and we are assuming that Carleton borrowers will also have exactly these incomes by age.

As we suggested above, the age-income profile describes the effect of mere aging or seniority in a static economic environment. Thus, the average individual (and average Carleton borrower?!) who has graduated and is 22 years old this year will be earning $4842 and can expect merely through seniority to receive an additional $614 when he becomes 23 a year later (see Table II). Of course, the term "a year later" obscures a series of other events which we have subsumed under the heading of "changes in the economic environment; "in addition to his seniority increases, the average borrower should benefit from economy-wide increases in money incomes due to inflationary pressures (cost-of-living increases) and general increases in labor productivity. We will, however, postpone discussion of these effects to the next section on Changes in the Economic Environment. In short, we are assuming that the 1971 distribution of earnings by age will accurately predict the changes in income due only to seniority in 1972, 1973, 1974, etc.

The age-average income profile also subsumes several other important problems. In the years immediately following graduation from undergraduate institutions, many borrowers will earn little or no income because of continuing education or (for males) service in the Armed Forces. Fortunately, most of these individuals have been included in computing the average income for each age group. Those serving in the Armed Forces, for example, are considered "employed" by the Census Bureau, and their relatively low incomes are included in the average figure. Similarly, those graduate students with scholarships or assistantship incomes are included in the average as well. This accounts in large part, for the intuitively "too low" initial incomes ($4842) in the age-income profile. Thus, were Carleton to request beginning repayments immediately after the first full earning year, it could still expect average borrower incomes somewhere in the $4500-$5500 range even though many borrowers were not yet fully launched on their lifetime careers.

While the Age-Income Profile is the hardest of our data on income prospects, it was still subject to some degree of "soft" estimation. As indicated in Table II, our age-income profile is an "adjusted" profile based on "hard" data published by the Census Bureau for males only in 1968[16] and corrected for money income increases between 1968 and 1971 and for the inclusion of female borrowers. The "inflation adjustment" for males only was a simple matter of raising the mean income for each age group for three years at the average annual rate of growth in money income during that period of 4.8 percent.[17] There seemed no obvious reason why inflation and productivity increases should effect age groups in a significantly different way.

The adjustment to include female incomes was somewhat more conplex. Employed females (with four or more years of education) typically earn much lower incomes than their male counterparts; as Table III indicates employed female incomes are only 35 to 45 percent of male incomes depending on their age bracket (sex discrimination ratio). Moreover, many fewer females in any sample of college graduates will actually be employed; the proportion of females participating in the labor force (labor participation ratio) will range from 65 to 75 percent of the total in any sample of women college graduates. Obviously, if Carleton lends any significant amount to women students it will have to expect lower average earnings than indicated by the Census Bureau data on males only.

To correct for these problems we have made three basic assumptions: 1) the Sex Discrimination Ratio and Labor Participation Ratio are the same for Carleton women borrowers as for the population of college graduates as a whole, 2) Carleton women will borrow in rough proportion to their part in the Carleton student

Table II

Age Income Profiles--1971

1	2	3	4	5
Years After Graduation	Adjusted Mean Income of All Individuals with Four or More Years of Education by Age (Assumed Same as Borrower Income)	Males Only (Published Data--1968)	Males Only (Adjusted for Money Income Increases to 1971)	Females Only (1971)
1	4842	5130	5905	2421
2	5456	5781	6654	2728
3	6053	6413	7382	3027
4	6631	7026	8087	3316
5	7192	7620	8771	3596
6	7736	8196	9434	3868
7	8261	8753	10075	4131
8	8769	9291	10694	4385
9	9260	9811	11293	4630
10	9732	10311	11868	4866
11	10187	10793	12423	5093
12	10624	11256	12956	5312
13	11044	11701	13468	4444
14	11445	12126	13957	4606
15	11829	12533	14426	4761
16	12195	12921	14872	4908
17	12544	13290	15297	5048
18	12875	13641	15701	5181
19	13187	13972	16082	5307
20	13482	14285	16442	5426
21	13760	14579	16781	5538
22	14020	14854	17097	5642
23	14262	15111	17393	6609
24	14487	15349	17667	6713
25	14694	15568	17919	6809
26	14882	15768	18149	6897
27	15054	15949	18358	6976
28	15207	16112	18545	7047
29	15343	16256	18711	7110
30	15461	16381	18855	7165
31	15561	16487	18977	7211
32	15644	16575	19078	7250
33	15708	16643	19156	7279
34	15755	16693	19214	7301
35	15785	16727	19250	7315

Table III

Sex Discrimination Ratios--Labor Participation Ratios

Age Groups	Income of Females as a Proportion of Male Incomes (Sex Discrimination Ratios)	Proportion of Female Graduates Employed (Labor Participation Ratios)
22-34	.41	.65
35-44	.33	.66
45-54	.38	.72

population (approaching 50 percent, now) and 3) that they will all marry and their repayments will be based on 50 percent of their own and spouses joint incomes (as specified in nearly all PAYE programs). We, first, computed average incomes of employed females by applying the Sex Discrimination Ratio to our male income data (Table II, Column 5). We then computed joint incomes for married women borrowers applying the Labor Participation Ratio. For example, the 65 percent of women borrowers who worked in the 22 to 34 age group would make payments on the basis of one-half of their own plus husband's incomes; the remaining 35 percent who did not work would make payments on the basis of one half of their husband's income only. Finally, we took a weighted average of these two groups of average income figures weighing them by the proportion of women borrowers (50 percent).

More formally, our adjustment was based on the following computational formula:

$$Y_i = .5Y_{mi} + .5\ P_i \left[\frac{Ymi + d_i Y_{mi}}{2} + (1-P_i) \frac{Y_{mi}}{2} \right]$$

where

Y_i = Adjusted Mean Income in any (i) age bracket

Y_{mi} = Male Only Mean Income in any (i) age bracket

P_i = Labor Participation Ratio for any (i) age bracket

d_i = Discrimination Ratio for any (i) age bracket

As can be seen, our adjusted income figures are about four-fifths of the male only figures. While women earn considerably less than men and are not employed as often, their inclusion in an overall average reduces it by considerably less than might be expected. This is partly because males still account for 50 percent of our borrowers and because the incomes of women borrowers are still based in part on the incomes of their (male) spouses.

To conclude this section, we might also underline several of the relevant characteristics of our age-income profile. It is first of all an inverted parabola.

Indeed, the Census Bureau estimated its male income profile by fitting such a parabola to a discontinuous series of age-income plots. This means, presumably, that the positive effects of aging on incomes diminishes the older the individual becomes. This inplies, in turn, that the short maturity PAYE package will have proportionally lower tax rates because the seniority increases in income are larger in those early years. Another interesting statistic is the average size of the "seniority increase"; an individual can expect roughly a $500 average annual increase in earnings over the first 25 years merely because he has grown one year older. Finally, these seniority increases produce a surprisingly high average annual rate of growth in income of 3.5 percent.

The Growing Economy and Changes in the Economic Environment. The other component of growth in borrower incomes we have characterized as that due to changes in the economic environment or more specifically due to changes in inflation rates and labor productivity increases. The average borrower aged 25 in 1971 (earning $6631) will earn less than the average borrower also aged 25 in 1972 because in the interim all borrowers' incomes, whatever their age, will have grown by, say 5 percent due to economy-wide increases in money incomes.

We have decided that predicting these money income growth rates from separate predictions of inflation rates and productivity increases is unnecessary and undesirable. We are, after all, interested in aggregate growth rates in money incomes from whatever source, and a great deal of historical data is available for simply money income alone. There are, moreover, many conceptual problems in predicting and measuring the separate influences of inflation and productivity increases on income. Price indices used to separate "real" from monetary phenomena are often questionable. More importantly, there may be a close negative correlation between inflation rates and productivity increases. Thus, a "high" estimated inflation rate may not be consistent with a "high" estimated rate of productivity increase. Unless we know the underlying relationship between both sources of growth in money incomes, predicting from separate estimates of each will be unreliable.

Table IV presents historical figures for average annual growth rates in per capita Gross National Product for a wide range of selected time periods. It is quite obvious that one must be extremely careful in choosing past rates to predict the future; depending on the time period, rates of growth vary from minus 2 percent to plus 11.1 percent. The most obvious criterion in choosing time periods is length. Economic growth is typically characterized by short-run cyclical variations and a "short" 5 or 10 year period (e.g. 1914-19, 1929-39, or 1965-69) may include only the "upswing or downswing". Since the average maturity of our prospective loan program is of a fairly long-run nature, this cyclical activity should "wash out" over the maturity of the average loan. Given this criterion, rates of growth of 4.0 to 4.7 percent seem historically reasonable (1914 to 1946, 1954, 1965, and 1969).

Another reasonable criterion is "recency". Economic structures appear to change only very slowly and inexorably, but it would appear that the recent past would be a better predictor of the future than the far past. Most obviously, government economic policy has evolved considerably since 1929, and this has both dampened the cycle and added an apparent inflationary bias to economic growth. Growth rates in money incomes have been correspondingly higher since 1948, and growth rates of 4.5 to 5.5 (1946 to 1954, 1965 and 1969) seem most reasonable given this criterion.

Table IV

Growth Rate in Per Capita Money GNP 1914--1969

	Initial Year						
	1914	1919	1929	1939	1946	1951	1965
1914							
1919	11.1						
1929	5.1	1.3					
1939	2.3	-.5	-2.0				
1945	4.0	4.0	3.5	9.1			
1954	4.5	3.4	4.0	8.1	5.4		
1965	4.4	3.4	4.0	6.5	4.8	4.3	
1969	4.7	3.8	4.1	6.6	5.0	4.9	6.9

We have decided that a 4.5 percent rate is probably the most valid "conservative" estimate of future growth rates in money income. It lies at the upper end of the long-period growth rates (1914-1960's) and at the lower end of the most recent "long" periods (1946-1960's). This reflects in part our basic conservatism, but there is also some evidence that after years of the "new economics" there is now in motion a gradual shift in attitude against inflation, at least in stated public policy.

We have also sought to verify these data by comparing them with Census Bureau figures on annual compound growth rates for persons 14 years and older in the U. S. Our per capita GNP data merely divide GNP by total population, and these aggregates may be too broad to reflect accurately individual money incomes. The Census Bureau actually samples a group of "persons" each year, and compares incomes over time to determine annual growth rates. As can be seen in Table V, the data do verify our per capita money GNP figures.

Table V

Annual Compound Growth Rates in Sample Incomes of Persons 14 Years or Older, 1948-68

All Males -- 4.8%
Employed Males -- 5.3%

All Females -- 3.3%
Employed Females -- 4.4%

Evaluations of Pilot Project Incomes and Recalculations of Breakeven Tax Rates.

Table VI summarizes our predictions of average borrower incomes for the borrowing cohort of 1971-72. It is the benchmark, we are suggesting, against which reported pilot project incomes should be evaluated. Column 3 (Expected Incomes of Average Borrower by Year) contains the key predictions. These are based on our 1971 Age-Income Profile (column 2), suitably adjusted upward for economy-wide money income growth at 4.5 percent. We remind the reader again that lending in 1971 will not produce the first repayment until 1974 based on the borrower's first full year's income of 1973. Therefore our 1971 initial income prediction of $4842

Table VI

Expected Lifetime Incomes and
Average Borrower Repayments--Class of 72

1	2	plus compounding at 4.5 percent =	3	4	5
Year	Age Income Profile 1971		Expected income of average borrowed by year	Annual payments of average borrower (computed at t=.0042)*	Present value of annual payments discounted at 7%
1971	- - - - - - - - - - - - - - -		$1,000 loan	- - - - - - - - - - - - - - - - - -	
1972	- - - - - - Graduation - 6 months earning only- - - - - - - - - - - -				
1973	4842		5288	repayments based on 1973 income	
1974	5456		6277	22	19
1975	6053		7219	26	21
1976	6631		8264	30	23
1977	7192		9366	35	25
1978	7736		10527	39	26
1979	8261		11749	44	28
1980	8769		13032	49	29
1981	9260		14381	55	30
1982	9732		15793	60	31
1983	10187		17276	66	32
1984	10624		18828	73	32
1985	11044		20452	79	33
1986	11445		22149	86	33
1987	11827		23923	93	34
1988	12195		24773	100	34
1989	12544		27702	108	34
1990	12875		29713	116	34
1991	13187		31802	125	35
1992	13482		33979	134	35
1993	13760		36240	143	34
1994	14020		28584	152	34
1995	14262		41018	162	34
1996	14487		43539	172	34
1997	14694		46148	183	34
1998	14882		48843	194	33
1999	15054		51629	205	33
2000	15207		54502	217	33
2001	15343		57464	229	32
2002	15461		60512	241	32
2003	15561		63644	254	31
2004	15644		66682	267	31
2005	15708		70157	281	30
2006	15755		73536	295	30
2007	15785		76989	309	29
2008	- - - - not applicable - - - -			323	28

*Repayments based on previous year's income and beginning two years after graduation.

has been raised to $5288 to account for two years of inflation in money income. For completeness, we have also calculated the annual dollar repayments, of our average borrower (Column 4) and the discounted value of these repayments at 7% interest (Column 5) assuming he borrowed $1000 under a 35 year maturity program and assuming our breakeven tax rate of .0042.

We also wish to remind the reader again that these predictions are based on extremely limiting assumptions, and we also warn him that intuition will be a poor guide in evaluating them. Most obviously, initial incomes of $5288 seem intuitively "too low," and many will find the prediction of $76,989 for the average income in the year 2006, "too high." We can only remind the reader that this $5288 initial income figure assumes that 35 percent of our women borrowers will not be working and that those who do work will be earning only 40 percent as much as men borrowers. Moreover, many men borrowers will be graduate students or serving in the Armed Forces. We should also remind the reader that the mean income in 1939 (32 years ago) was only $1,250 by contrast with $8,800 today, and we have merely projected roughly the same rate of growth over the next 35 years to reach our $76,989 figure.

The two major tasks of pilot plan evaluation will be to verify these figures and to alter breakeven tax rates for the full program accordingly. It should be possible almost immediately to verify whether the Carleton student body as a whole has higher than average income expectations (as one might believe) and to measure the degree of adverse selection among those actually choosing to borrow within the student body. If in the first three or four years of repayments, average incomes and repayments diverge significantly from those predicted, we will have learned (hopefully fairly cheaply) that our borrowers are not chosen randomly from a distribution similar to the one for the economy as a whole. Tax rates, in turn, can be adjusted upward or downward accordingly.

Verifying the long-run rate of growth in money incomes will be a good deal more difficult. It is likely that repayments during these few short years of the pilot program will be made during either an economy-wide, cyclical upswing or downswing. Considerable "good judgment" will be necessary to determine whether the measured rates of growth in money incomes will persist over the long-run or be "washed-out" by later changes in growth rates.

This problem of short-run cyclical variations in borrower income growth suggests another warning to those evaluating pilot incomes. A mere divergence of actual incomes from our predicted income path during the first few years of the pilot is not in itself evidence that our predictions are invalid. There may be no "adverse" or "special" selection, no difference between Carleton graduates and their peers elsewhere, and a long-run rate of money income growth quite close to our predicted 4.5 percent. However, if the economy is in a temporary downswing, for example, borrower incomes will be lower than predicted. This suggests any evaluation should seek separate verifications of the age-income profile, on the one hand, and growth rates in money income on the other.

Finally, we should point out that later "correlations" in tax rates may be easier than they appear at first glance and that "mistakes" are not as threatening. Even if borrower incomes behave exactly as predicted, tax rates must be adjusted downward for each new year of the program to break even at a given cost of borrowing. This is because every "crop" of new borrowers will presumably begin repayments on the basis of higher (inflation increased) initial incomes than their

counterparts the year before. (See Table VII) Thus if the pilot project were to hold our suggested tax rate (e.g., .0042 for 35 years) constant over its four-year lifetime, Carleton would be provided with automatic "insurance" against any over-estimate of borrower incomes. Indeed, if borrower incomes behave as predicted or better than predicted, Carleton would more than cover its borrowing costs, i.e., "make money" were tax rates not adjusted downward each year during the pilot's four years.

Table VII

Downward Adjustments in Breakeven Tax Rates For Each New Year of Borrowing

Lending Year	Initial Average Income	Breakeven Tax Rate for 35 Year Maturity Loan
1971	$5288	.0042
1972	5552	.0040
1973	5764	.0039
1974	6028	.0037
1975	6293	.0035
1976	6610	.0034
1977	6874	.0032
1978	7192	.0031

Relaxation of Our Basic Assumptions

To conclude this Chapter we will discuss the sources of possible divergences from our predicted income paths "in an effort to at least establish the direction of our errors if not their actual magnitudes." We have decided that, if anything, our income predictions are perhaps too optimistic and that several one-hundreths of one percent might be added to the calculated breakeven tax rates as additional "insurance" against mistakes. We also strongly emphasize that there is little evidence to support this conclusion, short of "gut conservatism;" indeed, what little evidence we have seems to argue for little change in the initial tax rates.

There are three basic sources of possible divergences from our predicted income paths: 1) adverse selection and associated with it the effects of the automatic exit provision; 2) the possibility that Carleton students have income prospects that differ from those for all persons with four or more years of education; and 3) sharp discontinuities in economy-wide growth patterns between the recent past and near future, e.g., wage-price controls, a new wartime inflation, or a post-war deflation. Unfortunately we can say little about #3, and #1 and #2 probably work in directions opposite from each other--#1 (adverse selection) tending to lower income prospects and #2 (Carleton's "special" educational advantages) tending to raise income prospects.

We have already discussed adverse selection in Chapter I and concluded it was fairly limited. A major source of adverse selection, above average female interest in the plan, was non-existent, we found, or even favorable to Carleton; the "negative dowry" effect apparently (more than?) outweighed the "good deal" effect

for women. On the other hand, the above-average interest by those on student aid and with lower family incomes (good predictors of lower ex ante incomes) suggested some adverse selection from this source.

Added to this are the negative effects of our opt-out provision. Presumably Carleton would want to offer such a provision to reduce adverse selection, and to the extent those borrowers with high ex post incomes opted out, the average incomes we are predicting for each year would be over-estimates. These negative effects, however, would be fairly limited. Since there is little evidence of "natural" adverse selection, fairly high opt-out effective yields a la Yale (10-12 percent) should be acceptable to borrowers. And, relatively few people will earn incomes that produce automatic exit at such high rates. As we indicated in the Introduction, an individual opting out in the 20th year under Yale's opt-out plan would have to be earning a salary of $95,000, roughly three times the income we predict for our average borrower in the 20th year. (See Table VI)

Against these negative effects must be weighed the positive effects of Carleton's special educational status. Mere attendance at Carleton seems to assure higher than average earnings prospects. Most obviously, many more Carleton students (45-50 percent) now go on to graduate school (see Table VIII) than in the economy-wide sample on which we based income predictions (20-25 percent).[18] In turn, mere attendance at graduate school assures somewhat higher than average mean incomes. Those with only four years of college education in 1970, for example, earned incomes roughly 75 percent of those with five or more years of college education. (Males: $13,260 versus $15,100; Females $5,210 versus $7,160.) Added to this, the Carleton student body tends to have higher than average family incomes, to be less racially mixed, and to somewhat be more intellectually able as measured by College Entrance Examination Board test results--all more or less reliable predictors of higher than average earnings prospects.

How to weigh these two opposing sources of error in our predictions is an unanswerable question without considerably more data on alumni incomes and actual pilot plan results. At this point it seems best merely to outline the questions rather than attempt an unreliable answer.

As our final task we have sought to estimate first year average borrower incomes from purely "Carleton" (Placement Service) data to compare with our Census data predictions. As indicated in Table VIII, the Carleton class of 1970 had average incomes remarkably like our first year figures in Table VI, the 1971 Age-Income Profile. The reader should be warned, however, that the "Carleton" predictions were based on virtual "guesstimates" of average incomes in each category of post-graduation activity. The percentage of students in each activity, on the other hand are fairly hard data.

The relevant "Carleton" figure for comparison with the Census Bureau data is the estimated mean income for the total senior class ($4500); again, the Census Bureau includes the assistantship and scholarship receipts of graduate students in its definitions of income. The fact that the mean Carleton income was somewhat below our economy-wide figure of $4842 is easily explained by the above-average proportion of Carleton students in graduate school (and will probably imply higher than average incomes three and four years later).

The existence of the large number of graduate students among our borrowers will pose another (hopefully) minor problem of pilot design and further problems

Table VIII

Initial Mean Incomes by
Activity Carleton Senior Class--1970

	Percent of Senior Class	Percent of those not in Grad School	Estimated Mean Income
Total Senior Class	100		$4500*
Further Study	46		2000
Employed	54	100	5299
Business Industry Government Research	13	26	8500
Teaching Social Work	9	17	7500
Non-Career Work (Vista, Peace Corps) Theater and Dance	8	15	1000
Military Service	3	8	1000
Other Employed or Married (income based on 1/2 of husband's income)	24	33	4800

*Compare with Table VI

of pilot evaluation. Most PAYE plans do not begin repayments until after the borrower ceases being a full-time student. This means, surprisingly, that a lower tax rate than the ones we have calculated would be necessary for Carleton to break-even. Even though the lender "waits" several more years for the first repayment from, say 40 percent, of its borrowers, the higher (inflation adjusted) incomes that they will be earning at that later time would more than offset the negative effects of the delay. While this is yet another source of "insurance" against mistakes in prediction--we have assumed in our predictions that everyone begins repayments after the first full year of earnings--it will make pilot evaluation somewhat more difficult. Those early year repayment and income data generated by the pilot will obviously diverge from our predicted pattern as grad students enter the labor force in gradually increasing numbers and begin repayment.

Chapter III

LIQUIDITY AND THE ACCUMULATION OF DEBT

> "Tuition Postponement" or "Deferred Tuition" plans such as have been announced by Yale and Duke, however successful at those institutions, are not viable options for the great majority of colleges and universities which do not have the resources to accept the risks involved and to carry the cash flow costs.[19]

While this conclusion may be somewhat overstated it underlines the seriousness of the so-called "liquidity problem." Simply put, this is the complex of problems associated with large accumulations of debt and the corresponding risks of insolvency. More precisely, this problem can be conceptually subdivided into two sub-components: 1) the problem of mere debt size, i.e. the absolute volume of financing required, and 2) the problem of unexpected fluctuations (and associated risks) in those financing requirements.

Some General Observations

Even in a world of perfect knowledge where receipts and payments were known with absolute certainty, the mere amount of indebtedness would be important because institutions and individuals typically have an aversion to debt and because capital markets are imperfect and lenders place upper limits on loan size. In addition, however, receipts and payments rarely behave as predicted, and one must also expect some unexpected fluctuations in financing requirements. This raises the possibility of the indebted institution becoming a "necessitous borrower" either becoming bankrupt or being forced to accept undesirable outside lender interference. These conceptually separate problems of size and fluctuations in financing requirements are, of course, related in practice. The larger the debt, the more likely unexpected fluctuations in financing requirements lead to insolvency.

At the very least an on-going Carleton PAYE program financed in the commercial loan market would necessitate a totally different college attitude toward the acceptability of large amounts of accumulated debt and the desirability of annual "deficits." Even assuming all our income predictions were validated by actual repayment behavior, the college would still become heavily indebted over a fairly long period of time. The most modest pilot program, for example, (lending $250,000 over four years at a constant tax rate and terminating thereafter) would require a maximum of outside financing (or commitment of endowment funds) of over $510,000 23 years after the first loan and would repay all debt only 40 years after the start of the program. Far more striking, a full and on-going program which sought to provide $100,000 in loans each year in real terms at constant tax rates--the dollar amount lent each year would rise at 3-4 percent with inflation--would have accumulated somewhat less than $2.5 million in debt by its fifteenth year with the debt still rising. While the value of our endowment (as well as the value of our PAYE assets) would undoubtedly also rise in a corresponding way, accumulated PAYE debt could consistently amount to as much as 5 percent of Carleton's endowment.

In fairness to PAYE, however, we strongly emplasize that the accumulation of

large volumes of debt would be hardly unique to a PAYE program; any loan program of similar magnitudes and equal maturity administered by the college where amounts lent rose with inflation would produce nearly as large an accumulation of debt. Indeed, college administrators are consistently surprised by their inability to mount "self-financing" (in the short-run) conventional loan programs in the face of rising student needs. Loan programs which were deemed "sufficient" a short four or five years ago are increasingly "too modest" and in need of new borrowing or endowment funds. It is true, of course, that PAYE's emphasis on long maturities and lower early payments would make it somewhat less "liquid" than a conventional loan program, but this is only a matter of degree and could be ameliorated by limiting PAYE maturities and raising the tax rate. Before PAYE is dismissed on grounds that it requires "excessive" outside financing, Carleton must decide whether it wishes to be a lending institution at all. If it does choose to provide student loans and accepts debt accumulation, then PAYE may well be the preferable program for other reasons.

In addition, the steady growth of accumulated debt obscures the fact that a program need merely be terminated to stop the growth. Debt rises not because of "insufficient" yields on past lending but because of continually rising new commitments. Only unless PAYE tax rates (or interest charged on conventional loans) were established to cover both borrowing costs and new loan commitments would debt ever stop accumulating in any program as long as loans rise with inflation.

There is another liquidity criterion, however, on which a conventional loan program might well be preferred to a PAYE program. A full PAYE program would expose the institution to a degree of risk, or better "uncertainty," that it might find insupportable. While we have considerable confidence in our long-run predictions of borrower income growth, we know they are subject to an uncertain amount of error and, more importantly, we know that borrowing costs are variable or even worse, that lending institutions sometimes refuse to refinance debt at any price in times of monetary stringency. While a conventional loan program would also be subject to the risk of short-run changes in borrowing costs, student repayments should be decidedly more certain under a conventional fixed repayment system than under PAYE. Under a pilot PAYE plan a relatively small error in our predictions of borrower income growth rates (a divergence from our 4.5 percent prediction to a 3.5 growth rate) could unexpectedly increase financing requirements by as much as 5 percent in one year and would mean that we never break even.

Again in fairness to PAYE we should emphasize that if the risks of repayment variability were known, Carleton could protect itself against these occurences by maintaining a (costly?) endowment reserve like a reserve against bad debts. The foregone income on this reserve would, of course, have to be included as the "liquidity cost" of the PAYE program and tax rates appropriately adjusted upward, or better, not readjusted downward as rapidly. Nevertheless, the risk of insolvency can be eliminated or "insured" against at some cost.

We should, in turn, emphasize that the term "reserve" is somewhat misleading. It should not be construed as a sum of money "lost" to the institution, but rather a change in the composition of endowment assets or better a shift in college investment policies. We would want to assure that a somewhat larger portion of the endowment than currently was easily accessible and quickly marketable in case of need. The "cost" of these "reserves" in turn would be the differential in endowment yields of a "conservative", liquidity-oriented investment policy with PAYE versus a more aggressive investment policy without PAYE. Since the College

currently pursues a fairly conservative investment policy (without PAYE) with heavy emphasis on "governments" and bonds, these "liquidity costs" should not be excessive.

The major failing of this treatment of risk is that without 10 or 15 years of repayment data we have no real knowledge of the probabilities of various levels of repayment fluctuations. Economists distinguish between decisions involving "risk" where the likelihoods of variations from predicted or most likely outcomes are known and decisions involving "uncertainty" where nothing is known about the likelihood of variations except that they may occur. In the former case there is no real problem. A bank, for example, knows that there is a, say, 1 in 20 chance of cash withdrawals exceeding cash deposits by one-tenth of their short-term debt (deposit liabilities) outstanding. So, to protect themselves against the risk of this 1 in 20 occurence they maintain an amount of cash reserves equal to that 10 percent proportion of deposit liabilities. In the case of "uncertain" decisions (like PAYE?), however, we have no objective actuarial probabilities on repayment fluctuations and cannot be sure what our "optimal" reserves should be. And, even a four-year pilot program is unlikely to generate the kinds of information on the probabilities of repayment variations that we would need in order to feel confident that our reserves were "sufficient."

We should also remind the reader that on at least one criterion PAYE should be less risky than a conventional program. The whole conceptual basis for PAYE was that default risks would be significantly reduced by making repayments income-contingent. Such default risks are probably not great with a conventional loan program during "normal" times. However, a major depression and significant unemployment would undoubtedly cause much sharper declines in conventional loan repayments than in PAYE repayments.

Finally, we should point out that some reduction in illiquidity is possible were we to finance a portion of the PAYE program out of repayments from the college's own conventional loan program. i.e. convert the conventional program into PAYE loans. With repayments from a fairly sharp increase in conventional lending five and six years ago beginning to rise as Carleton borrowers graduate from graduate school and with an expected improvement in billing procedures, Carleton can expect average conventional loan repayments of nearly $100,000 for the next four or five years. These could finance virtually all of the pilot project and somewhat reduce the maximum debt accumulations of an on-going program. While this kind of financing would have the same borrowing costs as outside financing, i.e. we would sacrifice the 6-7 percent yield that might be earned were these conventional repayments utilized elsewhere, they would reduce significantly our "liquidity costs" by reducing the risk of insolvency and outside (lender) interference in college affairs.

Cash-Flows and Debt Accumulation

We will seek primarily in this section to provide illustrative cash-flow models for a pilot and an on-going PAYE program and to contrast these with similar conventional programs. We will also consider the possibility of "internal" financing of our new PAYE loans from loan repayments on past conventional lending. Throughout this section we will assume our long-run income predictions are validated and that there are no short-run divergencies from these predicted paths. In the next section on risk and uncertainty we will relax this assumption to give a

notion of the kinds of repayment short-falls and associated risk and uncertainty we might be confronted with.

Throughout this section our primary concern will be the time paths of accumulated debt outstanding and associated interest costs. However, we remind the reader that by the definition of the breakeven tax rate this debt is just matched by an equal value of new loan assets. All too often, it is forgotten that a student loan program which generates the need for outside funds also generates student promissory notes which are at base no different than a house mortgage. Even at Carleton, however, these are thought of under the rather undistinguished heading of "Accounts and Notes Payable" and are hardly treated in the same category as endowment funds. To be sure, they are much less liquid assets than a well-known security because of the lack of a secondary resale market, but borrowing against them is far different from borrowing against nothing at all or mortgaging Willis Hall.

Our methodology is to assume basically the same income profile as with our single "senior" borrower in Chapter II (the Age-Income Profile suitably adjusted for economy-wide money income growth at 4.5 percent). Here, however, we will take into account several new complications. First, there will obviously be more than a single average borrower in each class and there will be a new crop of such borrowers every new year of the program until its termination. Thus, in the seventh year of an on-going program four classes will be making repayments. The average borrower in the "oldest" class will be making repayments on the basis of an income equal to that for four years after graduation in the Age-Income Profile suitably adjusted upward for five years of inflation. The average borrower in the next oldest class will be making repayments on the basis of a "3-year after graduation" income adjusted upward for the same five years of inflation and so on for the third oldest and fourth oldest classes. Finally, these repayments per $1000 borrowed by the average borrower in each class are multiplied by the number of $1000 loans made to that class.

With this complication of a new crop of borrowers each year with rising initial incomes, we can no longer side-step the question of downward readjustments in the tax rate charged each new class. For simplicity and prudence we do not readjust the tax rate downward in our proposed four-year pilot program; it is held constant at our recommended .0042 level. This, we have argued is our insurance against mistakes and will make little difference in cash flow for a "short" four-year program. However, with no downward adjustment in tax rates our effective yeild on PAYE loans granted after the first year will rise above our 7 percent cost of borrowing and thereby lower the accumulation of debt. This bias is too significant in the on-going program to be ignored; without downward readjustments in tax rates borrowers in the fifteenth year of the program would be charged an effective yield approaching 11 percent. Moreover, we will seek to contrast debt paths of conventional loan programs with PAYE programs, and it is hardly fair to compare a 7 percent conventional program with a PAYE program where the effective yield rises above 7 percent with each new year of the program. Therefore in our simulation of on-going programs and any which contrast PAYE with conventional loans we will readjust tax rates downward along the lines suggested in Table VII.

Given these income paths and tax rates we then predict the sum of our annual payments in each year. These are subtracted from the new loans granted in that year and the difference is subtracted and added to the previous year's accumulated debt. The debt, in turn, accumulates interest at our costs of borrowing plus

administration, and the carrying cost is added to the accumulating debt each year. We assume, as well, in the on-going program that the annual amount lent is adjusted upward each year to meet rising student needs at our inflation rate of 3.0 percent.

As a final complication, we will introduce a "mix" of new borrowers from different classes in each year. In our "one borrower" calculations of break-even tax rates in Chapter II we assumed implicitly that all borrowers in each year were seniors who began repayments two years after graduation. In the cash flow calculations in this chapter, however, we will make the more realistic assumption that the annual volume of new loans is divided equally among the four classes. This means, in turn, that without offsetting adjustments underclass men would enjoy interest-free Carleton financing (on which Carleton must in turn pay interest) for several years prior to graduation. Post-graduation repayment deferments have been taken into account by our very low initial income predictions ($5822) but not the repayment deferments involved in underclass lending.

This complication would appear at first glance to require an increase in tax rates. However there are two additional forces working to offset it: 1) as we mentioned above, we are purposely (and prudently!) failing to readjust tax rates downward in the pilot program in order to provide insurance against mistakes and this means that we more than break even on lending to classes beyond the first year; 2) although the underclass borrower delays repayments longer than the senior borrower, his repayments are based on higher inflation adjusted incomes. In Chapter II, we assumed that the senior begins repayments two years after graduation whereas in the pilot we are assuming the underclass borrower begins repayments five, four, and three years after graduation when inflation has raised incomes yet more. The combination of these two effects more than offset the underclass repayment deferrals. Indeed, a pilot breakeven tax rate, which is in some sense an "average" of the differing breakeven tax rates which should be quoted each class, would be lower than our recommended rate, e.g., .00395 instead of .0042.

The Pilot Program

Table IX provides our predictions for pilot program cash flows over its 39 year lifetime. Again, we are assuming a total of $250,000 lent ($25,000 in the first year, $50,000 in the second, $75,000 in the third, $100,000 in the fourth and a termination thereafter). Column 2 is the dollar debt accumulation which results from the difference between repayments (Column 4) and new loans (Column 5) plus the effect of the accumulation of annual interest payments (Column 3) on that debt.

As can be seen, a terminal pilot poses little problem of liquidity measured in terms of dollar debt. Maximum debt occurs in the 23rd year after lending begins and is only $510,061. Moreover, should we succeed in shortening average maturities (by merely acceding to apparent student desires), in adding a few one-hundredths of one percent to our tax rate as added insurance, or "internally" financing a portion of our pilot program out of conventional loan repayments, we could virtually eliminate the need for outside funds. Indeed, if the $100,000 per year prediction for repayments on Carleton's past conventional lending is correct, we could not only finance all of the PAYE pilot out of past loan repayments, but finance a volume of new conventional lending such that the sum of the PAYE plus conventional loans remained roughly constant during the next four years. We have

Table IX

Pilot Program Cash Flows

1	2	3	4	5	6
Year	Accumulated Debt	Annual Interest Cost at 7%	Annual Dollar Repayments t=.0042	Discounted Annual Repayments at 7%	New Loans
1971	25000	0	0	0	25000
1972	76750	1750	0	0	50000
1973	157122	5373	0	0	75000
1974	267982	10999	139	113	100000
1975	286142	18759	599	457	0
1976	304561	20030	1611	1149	0
1977	322414	21319	3466	2309	0
1978	339461	22569	5522	3439	0
1979	355628	23762	7596	4421	0
1980	371078	24894	9444	5137	0
1981	386295	25976	10758	5469	0
1982	401194	27041	12142	5769	0
1983	415678	28084	13599	6038	0
1984	429644	29098	15132	6279	0
1985	442978	30075	16741	6493	0
1986	455555	31009	18431	6680	0
1987	467242	31889	20202	6843	0
1988	477891	32707	22058	6983	0
1989	487342	33452	24001	7101	0
1990	495423	34114	26033	7198	0
1991	501946	34680	28157	7276	0
1992	506709	35136	30373	7336	0
1993	509492	35470	32686	7378	0
1994	510061	35665	35096	7403	0
1995	508160	35704	37605	7414	0
1996	503516	35571	40216	7410	0
1997	495833	35246	42929	7392	0
1998	484794	34708	45747	7362	0
1999	470059	33936	48671	7320	0
2000	451262	32904	51001	7267	0
2001	428011	31588	54839	7204	0
2002	399887	29961	58085	7131	0
2003	366441	27992	61439	7050	0
2004	327191	25651	64901	6960	0
2005	281624	22903	68470	6862	0
2006	229190	19714	72147	6757	0
2007	169305	16043	75928	6646	0
2008	101344	11851	79813	6529	0
2009	26753	7094	81685	6245	0
2010	50423	1873	79049	5648	0
2011	0	0	68988	4607	0
2012	0	0	48122	3003	0
2013	0	0	27685	1615	0
2014	0	0	10527	574	0

argued, of course, that this will undoubtedly not be enough as tuition increases. As an interesting aside, we have also calculated the debt outstanding as a proportion of our endowment which we will assume rises at 5 percent. At no point in the pilot program does debt outstanding amount to more than 1 percent of our presumably rising endowment.

Finally, we wish to underline that this proposed pilot "makes money." By not adjusting the tax rate downward to account for rising initial incomes, we have "built in" a cushion of four years worth of additional repayments (2011-2014) after debt has been reduced to zero.

The Pilot and a Conventional Program Compared

While these debt paths may be suggestive, we feel a much more useful service can be accomplished in contrasting debt paths for a conventional loan program with our PAYE pilot. Both programs, we argue, will accumulate large amounts of debt, and it is only a matter of degree which accumulates more.

As we mentioned above, we have chosen in these simulations to make both programs strictly comparable by maturity and by yield, and this requires downward adjustments in PAYE tax rates. In the conventional model we assume a 7 percent yield for 10 and 35 year maturity programs. To account for underclass deferments in the conventional model, we assume that the underclass borrower opens an account for each $1000 borrowed which accumulates interest while he is in school at 7 percent until he begins repayments after graduation. These repayments (at the unchanged interest rate of 7 percent) are therefore based not on the original $1000 borrowed but the $1000 plus accumulated interest while in school. Our PAYE pilots, in turn, also break even at a 7 percent borrowing cost, or what is the same, they provide the same 7 percent yield as the conventional loan. As we mentioned above, this requires somewhat lower tax rates than those suggested in Chapter II, i.e., we eliminate our "cushion" or insurance against mistakes by reducing the tax rate charged all four classes to .00395 (from .0042) and .0163 (from .0171) for 35 and 10 year loans respectively.

As can be seen in the following tables, PAYE's lower annual repayments in early years clearly reduce liquidity in terms of the maximum amount of outside financing or capital necessary to carry it in any particular year. It also delays the point of maximum debt accumulation and raises significantly Carleton's interest costs or carrying charges.

While these cash flow estimates clearly favor conventional lending if debt accumulation is the sole criterion for judgment, we are more surprised at the two program's similarities than their differences. The conventional loan's maximum debt is still three-fifths of PAYE's debt (although it occurs much earlier) and more importantly, the difference between the two programs diminishes, the shorter their maturities. For example, there is almost no difference in the debt paths between a conventional 10-year program and a PAYE 10-year program. This suggests yet another reason to provide students the opportunity to choose from a range of maturities in hopes that the average PAYE maturity would be thereby shortened.

The reason for this reduction in debt accumulation differentials between PAYE and conventional lending as maturities for both are shortened lies in the differential time paths of their repayments. PAYE accumulates more debt no matter what

Table X

Conventional--PAYE Pilot Contrasts 35 Year Maturity

Year	Accumulated Debt		Interest Charges on Accumulated Debt		Annual Repayments		New Loans
	PAYE	Conventional	PAYE	Conventional	PAYE	Conventional	
1971	25000	25000	0	0	0	0	25000
1972	76750	76750	1750	1750	0	0	50000
1973	157122	157122	5373	5372	0	0	75000
1974	267989	267568	10999	10999	132	553	100000
1975	286178	284049	18759	18730	570	2249	0
1976	304676	298209	20033	19883	1535	5723	0
1977	322702	307434	21327	20875	3301	11650	0
1978	340032	311687	22589	21528	5259	17268	0
1979	356600	311675	23802	21818	7234	21830	0
1980	372568	308955	24962	21817	8994	24538	0
1981	388403	306044	26080	21627	10246	24538	0
1982	404027	302929	27188	21423	11564	24538	0
1983	419356	299596	28282	21205	12952	24538	0
1984	434300	296030	29355	20972	14411	24538	0
1985	448757	292215	30401	20722	15944	24538	0
1986	462617	288132	31413	20455	17553	24538	0
1987	475760	283764	32383	20169	19240	24538	0
1988	488056	279089	33303	19863	21008	24538	0
1989	499361	274088	34164	19536	22858	24538	0
1990	509523	268736	34955	19186	24794	24538	0
1991	518374	263010	35667	18812	26816	24538	0
1992	525733	256883	36286	18411	28927	24538	0
1993	531405	250327	36801	17982	31129	24538	0
1994	535179	243312	37198	17523	33425	24538	0
1995	536827	235806	37463	17032	35814	24538	0
1996	536104	227775	37578	16506	38301	24538	0
1997	532747	219182	37527	15944	40885	24538	0
1998	526470	209987	37292	15343	43569	24538	0
1999	516970	200148	36853	14699	46353	24538	0
2000	503918	189621	36188	14010	49239	24538	0
2001	486965	178356	35274	13273	52228	24538	0
2002	465734	166304	34088	12485	55319	24538	0
2003	439822	153407	32601	11641	58513	24538	0
2004	408799	139608	30788	10738	61810	24538	0
2005	372205	124843	28616	9773	65210	24538	0
2006	329548	109044	26054	8739	68711	24538	0
2007	280304	92139	23068	7633	72313	24538	0
2008	223913	74051	19621	6450	76012	24538	0
2009	161792	55250	15674	5184	77795	23985	0
2010	97833	36829	11325	3868	75285	22288	0
2011	38978	20592	6848	2578	65703	18815	0
2012	4124	9146	2728	1441	45831	18888	0
2013	0	2516	0	640	26366	7270	0
2014	0	16	0	0	10026	2708	0

Table XI

Conventional--PAYE Pilot Contrasts 10 Year Maturity

Year	Accumulated Debt PAYE	Accumulated Debt Conventional	Interest Charges on Accumulated Debt PAYE	Interest Charges on Accumulated Debt Conventional	Annual Repayments PAYE	Annual Repayments Conventional	New Loans
1971	25000	25000	0	0	0	0	25000
1972	76750	76750	1750	1750	0	0	50000
1973	157122	157122	5373	5372	0	0	75000
1974	267582	267102	10999	10999	539	1019	100000
1975	283398	281653	18731	18697	2323	4147	0
1976	297616	290819	19879	19716	6254	10550	0
1977	304998	289700	20833	20357	13451	21476	0
1978	304916	278147	21350	20279	21432	31832	0
1979	296780	257375	21344	19470	29479	40242	0
1980	280904	230157	20775	18016	36651	45234	0
1981	258817	201034	19663	16111	41751	45234	0
1982	229810	169873	18117	14072	47124	45234	0
1983	193118	136530	16087	11891	52779	45234	0
1984	149671	101871	13518	9557	56966	44215	0
1985	102610	67915	10477	7131	57537	41088	0
1986	57893	37984	7183	4754	51901	34685	0
1987	24981	16885	4052	2659	36964	23758	0
1988	5063	4665	1749	1182	21667	13402	0
1989	2964	1	354	327	8381	4992	0

the year, repayments are the same. In a 10-year PAYE plan, however, the differential between early and later repayments is far smaller than a 35-year PAYE plan because incomes (hence repayments) are rising exponentially. Put differently, the future incomes we are predicting for PAYE repayments rise more than proportionally with time; future incomes in the 20th year of the program are more than twice the increase in the 10th year. Hence the early-late repayment differential is not so great the fewer years are allowed to pass.

An Ongoing Program

Table XII summarizes our cash-flow predictions for an on-going PAYE plan. Again, these cash flows differ from those for our pilot simulations for two reasons: tax rates are adjusted downward and the program is never terminated. Dollar amounts lent, $100,000 annually in real terms, in fact, rise each year at 3 percent to cover rising tuition costs.

We again emphasize that this table is only illustrative and should not be used as the basis for detailed financing requests beyond the first few years of the program. The major difficulty is, again, that we cannot predict the maturity composition of our loan requests. However, since the debt accumulation problem is worse the longer the maturity of the loans, we have chosen here to assume the worst, i.e. all borrowers elect to repay on the basis of the longest maturity offered, a 35 year term.

Table XII

Ongoing PAYE Program Cash Flows

Year	Accumulated Debt	Annual Interest Cost at 7%	Annual Repayments (t adjusted downward from .0042	Discounted Annual Repayments at 7%	New Loans	Debt as Proportion of Endowment rising at 5%
1971	25000	0	0	0	25000	.001
1972	76750	1750	0	0	50000	.003
1973	157122	5373	0	0	75000	.006
1974	267982	10999	139	113	100000	.009
1975	389153	18759	588	499	103000	.013
1976	520906	27241	1577	1125	106090	.016
1977	663253	36464	3389	2258	109273	.010
1978	816279	46428	5953	3707	112551	.023
1979	980132	57140	9214	5362	115927	.026
1980	1155050	68609	13093	7121	119405	.030
1981	1341330	80854	17562	8927	122987	.033
1982	1539240	93894	22664	10767	126677	.036
1983	1749020	107747	28443	12629	130477	.039
1984	1970900	122432	34947	14502	134391	.041
1985	2205060	137963	42225	16376	138423	.044
1986	2451660	154354	50329	18241	142576	.047
1987	2710810	171616	59311	20091	146853	.049
1988	2982600	189757	69229	21916	151259	.051
1989	3267040	208783	80138	23710	155796	.054
1990	3564110	228693	92097	25466	160470	.056
1991	3873710	249488	105171	27178	165284	.058
1992	4195680	271160	119425	28843	170243	.060
1993	4529790	293699	134941	30458	175350	.061
1994	4875700	317086	151788	32019	180611	.063
1995	5232980	341300	170042	33523	186029	.064
1996	5601120	366310	189778	34966	191610	.066
1997	5979490	392080	211075	36346	197358	.067
1998	6367310	418565	234016	37660	203279	.068
1999	6763710	445713	258686	38907	209377	.068
2000	7167660	473461	285176	40085	215658	.069
2001	7577940	501737	313577	41194	222128	.070
2002	7993210	530457	343983	42232	228792	.070
2003	8411890	559526	375495	43199	235656	.070
2004	8832240	588834	411209	44096	242725	.070
2005	9252270	618258	448232	44921	250007	.070
2006	9669770	647661	487669	45676	257507	.070
2007	10082300	676885	529628	46361	265233	.070
2008	10487000	705760	574220	46976	273189	.068
2009	10883000	734091	619445	47361	281385	.068
2010	11271600	761812	663082	47380	289827	.067
2011	11656700	789012	702360	46904	298521	.066
2012	12046100	815973	734101	45816	307477	.065
2013	12445100	843228	760933	44384	316701	.064
2014	12857400	871157	785002	42792	326202	.063

As can be seen, a 35-year on-going PAYE program would accumulate drastically increased amounts of debt by contrast with a PAYE pilot of the same maturity. By the year 2014 when the last pilot repayment is made and pilot debt has been zero for four years, the on-going program has accumulated slightly under $13 million. Or, in the intuitively more comprehensible fifteenth year of the program, 1986, debt outstanding has risen to nearly $2.5 million.

These figures are to say the least rather disconcerting if one does not fully understand why debt accumulates. Moreover, a contrast with conventional lending should convince the reader that all on-going loan programs which increase dollar lending each year share the same problem of accumulated debt. First, debt accumulates solely because each year the lender acquires more new loan assets than in the previous year. If each of these new notes eventually paid more than the interest charged on the associated debt, then the program would be hardly undesirable even though it accumulated debt; it would be considered "profitable". The case of our on-going program is but a slight variation on the "profitable" program. Instead of acquiring new loan assets that pay more than our financing costs, we acquire new assets which just cover our borrowing and administrative costs. Put differently, dollar repayments merely cover borrowing and administrative costs, but do not finance a rising loan portfolio. Only if we were to raise tax rates (or interest charges on a conventional loan) could we both cover our borrowing and administrative costs and finance internally a rising volume of new loans. In short, if the program were ever terminated, whatever the year or the volume of outstanding debt, as long as our income predictions are correct every old loan note outstanding at that point in time will eventually repay principal plus accumulated interest at 7 percent. Thirty-five years later when the last note's final repayment is made, accumulated debt should be zero.

We also alert the reader to the fact that not only do we acquire assets against this accumulated debt but also presumably enjoy a rising liquidity reserve in the form of an annually increasing endowment. Assuming a 5 percent increase in the endowment's market value the proportion of PAYE debt to endowment volume increases at an average of about 5 percent over the period considered and rises to a maximum of only 7 percent (see Column 7).

Table XIII, again, contrasts on-going PAYE lending with a comparable conventional loan program. Both provide a 7 percent yield and just cover borrowing and administrative costs. Both also adjust new loan volumes upward at a rate of 3 percent annually. As would be expected, roughly the same differential in the volume of debt accumulation appears between PAYE and conventional lending; the conventional program generates debt which is consistently about 60 percent of PAYE's debt outstanding. Presumably this differential would diminish as with the pilot if the loan maturities for both programs are shortened.

Risk and Uncertainty

Before offering any further illustrative simulations, we would like to make several broad observations about this extremely complex subject. We have already discussed the distinction between risk and uncertainty and think it important to further conceptually subdivide the problem into the risk or uncertainty of: 1) ultimate unprofitability and 2) temporary (short-run) fluctuations in cash inflows and outflows. The latter case refers to short-run deviations from our predicted income paths and borrowing costs such that our predicted long run or "average"

Table XIII

Ongoing Conventional--PAYE Contrasts 35 Year Maturity

Year	Accumulated Debt		Interest Charges on Accumulated Debt		Annual Repayments		New Loans
	PAYE	Conventional	PAYE	Conventional	PAYE	Conventional	
1971	25000	25000	0	0	0	0	25000
1972	76750	76750	1750	1750	0	0	50000
1973	157122	157122	5373	5372	0	0	75000
1974	267982	267568	10999	10999	139	553	100000
1975	389153	387049	18759	18730	588	2249	103000
1976	520906	514509	27241	27093	1577	5723	106090
1977	663253	648147	36464	36016	3389	11650	109273
1978	816279	786524	46428	45370	5953	19544	112551
1979	980132	928619	57140	55057	9214	28889	115927
1980	1155050	1073900	68609	65003	13093	39129	119405
1981	1341330	1222380	80854	75173	17562	49676	122987
1982	1539240	1374090	93894	85567	22664	60540	126677
1983	1749020	1529020	107747	96186	28443	71729	130477
1984	1970900	1687190	122432	107031	34947	83254	134391
1985	2205060	1848590	137963	118103	42225	95125	138423
1986	2451660	2013210	154354	129401	50329	107352	142576
1987	2710810	2181040	171616	140925	59311	119946	146853
1988	2982600	2352060	189757	152673	69229	132918	151259
1989	3267040	2526220	208783	164644	80138	146279	155796
1990	3564110	2703480	228693	176835	92097	160041	160470
1991	3873710	2883790	249488	189244	105171	174215	165284
1992	4195680	3067080	271160	201865	119425	188815	170243
1993	4529790	3253280	293699	214696	134941	203853	175350
1994	4875700	3442270	317086	227729	151788	219342	180611
1995	5232980	3633960	341300	240959	170042	235295	186029
1996	5601120	3828220	366310	254378	189778	251727	191610
1997	5979490	4024900	392080	267976	211075	268652	197358
1998	6367310	4223840	418565	281743	234016	286085	203279
1999	6763710	4424840	445713	295669	258686	304041	209377
2000	7167660	4627700	473461	309739	285176	322536	215658
2001	7577940	4832180	501737	323939	313577	341585	222128
2002	7993210	5038020	530457	339253	343983	361206	228792
2003	8411890	5244920	559526	352661	376495	381416	235656
2004	8832240	5452560	588834	367144	411209	402231	242725
2005	9252270	5660570	618258	381679	448232	423671	250007
2006	9669770	5868560	647661	396240	487669	445755	257507
2007	10082300	6076090	676885	410799	529628	468501	265233
2008	10487000	6282670	705760	425326	574220	491929	273189
2009	10883000	6488340	734091	439787	619445	515508	281385
2010	11271600	6693680	761812	454184	663082	538666	289827
2011	11656700	6899960	789012	468558	702360	560793	298521
2012	12046100	7109200	815973	482998	734101	581234	307477
2013	12445100	7323050	843228	497644	760933	600500	316701
2014	12857400	7542730	871157	512613	785002	619130	326202

rates of income growth and interest costs, e.g., 4.5 percent and 7.0 percent respectively, are nevertheless validated. Under these circumstances the program would ultimately break even, i.e., be "profitable", and whatever risk and uncertainty exist would be only those of temporary and unexpected increases or decreases in financing needs. The former case refers to a long-run deviation from our predictions where the average of all short-run fluctuation adds up to income growth rates and borrowing costs above or below 4.5 and 7.0 percent respectively. Under these circumstances the program would either be unprofitable or excessively profitable with Carleton ending up either with positive debt at the end of the pilot or no debt several years earlier than expected.

The distinction, we feel, is important in assessing our risks and in negotiating for any risk-sharing with the ultimate source of funds. At the best, we should hope for a firm commitment from the lending institution both to refinance any unexpected short-run increases in debt from temporary repayment short-falls at unchanged borrowing costs and to excuse the repayment of some portion of the outstanding debt at the end of the program in the event it proves unprofitable. It seems unlikely that a private lending institution would share the latter sort of risk, i.e. that of ultimate unprofitability. And, if this be a sine qua non of Carleton's engaging in a pilot PAYE plan, efforts should instead be directed toward acquiring foundation support for the program.

In addition, we would like to remind the reader that there is often a "pessimism bias" in assessing risks. In a truly uncertain decision, one should probably assume that the risk of the "worst" occurring is no more likely than the "best" occuring. However, much more often, decision makers (to guard against the worst) ignore altogether the "best" eventuality, i.e., seek to "minimize the maximum loss." This approach may be valid for the PAYE decision as well, but we should emphasize that in economic growth the upturn in money incomes appears to be as inevitable as the downturn. Moreover, many defenders of PAYE have pointed to its unique "inflation hedge" attributes. They, in effect, argue that the past level of inflation is not a good predictor for the future and that there is an increasing inflationary bias to money incomes growth, i.e. our "conservative" 4.5 percent prediction for future growth is "too low." Only PAYE would provide a mechanism whereby loan repayments would rise with rising college costs. This would require, of course, that we not readjust tax rates downward more rapidly than expected as initial incomes of each new borrowing class rise more rapidly than expected.

We have also tended to overlook the possibility of risk-sharing with the individual borrower either in the form of possible changes in tax rate quotations over the maturity of any individual loan or at the least (as in Yale's PAYE program) in the form of changes in the interest rate at which the unpaid balance of 150 percent of amount borrowed is accumulated for opt-out. This may seem a tempting procedure for the "risk-averter", but we think it should be guarded against because of the probably counter-productive effects it would have on utilization; adding this uncertainty to an already uncertain decision to borrow might scare away many potential borrowers. Any risk-sharing with the borrower in the form of tax rate changes should take the form of different tax rate quotations for each new class and would probably be best defended as covering "changes in borrowing costs" not changes in income prospects. Once a tax rate is quoted any individual borrower it should be a fixed obligation.

Finally, the technical relationships between aggregate economics activity and the money market appear to provide a certain amount of automatic insurance against

short-run lender risk. While it is virtually impossible to predict the relationship between interest rates (our borrowing costs) and patterns of income growth for very short one or two year periods, it is unlikely that high interest rates will persist in the face of declining or very slow income growth over extended four and five year periods. Borrowing costs and borrowing incomes and repayments, therefore, are most likely to move in the same direction over extended periods (but with considerable lag). The effects of a depression on repayments and PAYE debt accumulation, in turn, are likely to be mitigated somewhat by an associated decline in carrying charges on that accumulated debt.

We do not wish by these observations to minimize the risks and uncertainty involved in PAYE lending. First, in Table XIV we have considered the effects of a one percentage point decline in long-run predictions of borrower income growth on debt accumulation for our 35-year pilot. As can be seen, dropping the income growth rate from 4.5 to 3.5 percent leaves Carleton at the end of the repayment period with over $585,000 in accumulated debt with no further repayments to retire that debt. Maximum debt accumulation, moreover would be nearly $625,000 or $115,000 greater than the maximum debt predicted for the 4.5 percent case. Roughly the same consequences would result from a rise in borrowing costs from 7 to 8.5 percent.

Table XIV

Effect of a Drop in Long-Run Income Growth Rates from 4.5 to 3.5 percent The 35-Year Pilot

Year	Debt Accumulation at 4.5%	Debt Accumulation at 3.5%
1971	25,000	25,000
1974	267,982	267,985
1978	339,461	340,039
1982	401,142	405,424
1986	455,555	469,087
1990	495,423	528,095
1994 (maximum 4.5)	510,061	577,818
1998	484,794	612,172
2002 (maximum 3.5)	397,887	623,293
2006	229,190	601,149
2010	50,423	540,817
2014 (last repayments)	0	486,310

We should emphasize, however, that such a large drop (24 percent) in long-run borrower income growth rates would seem unlikely particularly in light of our fairly conservative estimates and the inflationary experience of the recent past. We should also emphasize that changing long-run growth rates in money income is not at all the same as over-estimating initial borrower incomes (due to adverse selection, for example) on which the growth is compounded. A change in growth rates has a far more powerful effect on debt accumulation than a similar proportional change in initial income. To generate the same ill effects on debt accumulation and profitability as a one percentage point drop in growth rate, our initial income prediction ($5300) would have to be an overestimate of nearly $3500.

The hopefully more likely and more manageable kind of cash flow fluctuation we should experience are short-run divergences from our predicted path which offset each other to yield our breakeven long-run assumptions about borrowing costs and income growth rates. As we suggested above, we can guard aginst these eventualities by maintaining endowment reserves and by gaining some commitment from the lender to meet cash short-falls if these can be shown to be temporary.

Table XV summarizes the effects on pilot accumulated debt of short-run changes in borrowing costs and income growth rates under hypothetical "recession" and "depression" conditions. In our simulated "Recession of 1980-85" income growth rates drop to 2.5 percent and borrowing costs remain constant, rise, to 8 percent, and drop to 6 percent. In our simulated "Depression of 1980-85" income growth rates drop to zero with borrowing costs constant, rising to 8 percent, and falling to 4 percent. While it is unlikely that interest rates would remain constant, let alone rise in a depression, we have nevertheless considered these eventualities as our "worst" possibility.

As can be seen refinancing requirements under these "worst" conditions (I=.08, G=0) could rise by 11 percent of our expected requirements over the five year period. Under more likely conditions (borrowing costs constant or declining if banks don't hold Carleton to its long-term 7 percent obligation) the unexpected increase in borrowing needs would be more in the order of 5-6 percent of the expected amount. These changes, of course, only tell how much unexpected debt we would accumulate (in the short-run!), not whether banks would continue to refinance the "normal" volume of debt. We, nevertheless, feel that these simulations indicate that a PAYE pilot would not impose "excessive" liquidity problems.

This is equally true, it would appear, for an on-going program. To conclude this Chapter, we have prepared similar simulations of an on-going program in Table XVI. We have chosen to ignore the problem of long-run divergences from our 4.5-7 percent assumptions. Surely in an on-going program, tax rates can be adjusted downward less rapidly over a long period if income growth rates are consistently lower than expected and borrowing costs consistently higher. However, the impact of short-run (five-year) downswings is no more striking than with the pilot. As indicated, unexpected declines in income growth rates during depression conditions (a zero rate of growth) with borrowing costs constant at 7 percent would raise refinancing requirements by the end of the depression in 1986 by no more than $44,000 over the expected level of $2,451,660--a 2 percent increase.

Table XV

Accumulated Debt Path Given
Short-run Divergences From Assumed
Borrowing Costs and Income Growth Rates
"Event" Occurs in 1980 and
Continues through 1985
35 Year Pilot

a. Recession Conditions

Year	Expected Path I=.07 G=.045	Diverging Paths I=.08 G=.025	Diverging Paths I=.07 G=.025	Diverging Paths I=.06 G=.025
1971	25000	25000	25000	25000
-	-	-	-	-
1979	355628	355628	355628	355628
1980	371078	374815	371258	367702
1981	386295	394450	386897	379414
1982	401194	414547	402521	390721
1983	415678	435123	418109	401576
1984	429644	456195	433639	411932
1985	442978	477782	449084	421740
-	-	-	-	-
1986	455555	494814	464108	434849

b. Depression Conditions

Year	Expected Path I=.07 G=.045	Diverging Paths I=.08 G=0	Diverging Paths I=.07 G=0	Diverging Paths I=.04 G=0
1971	25000	25000	25000	25000
-	-	-	-	-
1979	355628	355628	355628	355628
1980	371078	375041	371484	360816
1981	386295	395182	387637	365397
1982	401194	416167	404131	369372
1983	415678	438057	421016	372743
1984	429644	460959	438345	375511
1985	442978	484980	456173	377675
-	-	-	-	-
1986	455555	504776	473953	389960

I = Borrowing Costs

G = Income Growth Rates

Table XVI

Accumulated Debt Paths Given
Short-run Divergences From Assumed
Borrowing Costs and Income Growth Rates
"Event" Occurs in 1980 and
Continues through 1985

35 Year Ongoing Program

Year	Expected Path I=.07 G=.045	Recession Conditions - - - I=.07 G=.025	Depression Conditions - - I=.07 G=0	Depression Conditions - - I=.05 G=0
1971	25000	25000	25000	25000
-	-	-	-	-
1979	980132	980132	980132	980132
1980	1155050	1155340	1155910	1136310
1981	1341330	1342670	1344350	1300650
1982	1539240	1542670	1546250	1473470
1983	1749020	1755960	1762470	1655130
1984	1970900	1983170	1993970	1846020
1985	2205060	2224960	2241770	2046540
-	-	-	-	-
1986	2451660	2481730	2505430	2296530

Chapter IV

THE ADMINISTRATIVE FUNCTION

Throughout our work to this point, we have implicitly assumed that a PAYE loan program could be efficiently and economically administered. In this Chapter we will attempt to ascertain the validity of that assumption. We will first define the administrative function and trace with considerable detail the processes that function implies. Intermixed with our tracing will be summaries of the methodology, effectiveness and problems of administering conventional loan programs as experienced by Carleton College and a variety of banks. Using this descriptive as a backdrop, we will then consider the special mechanics and problems of administering a long-term, income contingent loan program. The Chapter will conclude by utilizing our observations to analyze three specific problem areas:

1) Who should (could?) administer a PAYE type loan program? Can a small college like Carleton handle it alone or is some sort of consortium necessary? Would it be feasible (possible?) to turn the administration of the program over to a large commercial bank or comparable institution?

2) Are the costs of administration related more closely to the number of borrowers using the program or the size of the loans outstanding? Are the costs of administration primarily fixed or variable in relation to the number of borrowers? Do these considerations imply a need for a minimum size on loans?

3) Finally, what are the actual costs of administering such a program? Specifically, just how high per-unit administrative costs can be expected to be safely covered by the 1% we have added to the institution's borrowing costs in determining break-even tax rates?

Definition and Description

Loosely defined, the administrative function is the process of granting loans and encouraging (and possibly enforcing) loan repayments. For conceptual purposes we have found it useful to subdivide this process into six broad areas: 1) granting loans, 2) recording information about borrowers, 3) keeping track of borrowers after they graduate, 4) billing, 5) collection, and 6) sanctions. These areas are closely interrelated and each plays an important role in the effective administration of any type of loan program. We will analyse each area separately, however, and hope that our somewhat arbitrary distinctions do not blur the necessity for a complete and continuous administrative operation.

Granting Loans. The obvious first step in any loan program is the actual lending of money to interested borrowers. If a college is administering its own loan program, these loans can take the form of tuition (comprehensive fee) deferments; i.e., the amount borrowed can simply be credited to the student's account with the college. While the intellectual differences between this practice and the actual cash transfer involved in a conventional student loan are negligible, it is generally reassuring to be certain that the borrowed funds are being used for the "right" purpose. Bankers who deal in student loan program frequently tell "horror stories" of students who have borrowed funds to finance their education and soon afterward took European trips or purchased new cars. This frequently stated weakness of traditional student loans (the temptation of ready cash) can be, at least

in part, circumvented by a deferred tuition scheme.

Someone has to determine who should be allowed to borrow and how much the applicant can borrow. While we have strongly argued in previous sections against any rationing criterion for limited pilot funds that would result in a less than a representative cross-section of the school's student body, we can see no more logical candidate for the granting of loans than the school's Financial Aid Director. He is, after all, the resident "expert" in the financing of higher education from the student's point of view. Moreover, he (or she) is the only person in a position to adequately oversee and coordinate the school's entire package of broadly defined student "financial assistance".

We remain adamant, however, in our insistence that the success of the pilot program depends in large part on PAYE lending being kept conceptually and operationally distinct from the classical forms of "financial aid" (college loans, grants, and work contracts). Any restrictions on who is eligible for PAYE loans will distort the very pertinent data concerning how many people will actually borrow and what the profiles of these borrowers will be. Moreover, as we have discussed in the Introduction and will discuss more fully in the Conclusion, PAYE's conceptual framework is based on the premise that by eliminating an archaic and unattractive system of (fixed interest) repayments and replacing these with income-contingent repayments, more private capital can be attracted to educational finance, and as a side benefit, existing rationing criteria for subsidized (or guaranteed) loans can be eliminated. The PAYE proponents' position is basically that a person who is willing to borrow money at 7% interest has a "need" for the money regardless of what his Parents' Confidential Statement says. Conversely, so long as the lender can be relatively confident that he will be repaid ("break-even") he should be willing to lend money to any qualified potential borrower. If such a program ultimately is found attractive by both borrowers and lenders, it can be expanded to a large number of self-defined "needy" borrowers--thereby helping colleges maintain their present enrollments in the face of rising educational costs and shifting private capital to the more productive educational industry.

It would seem reasonable, given this conceptual framework, that in the early years of the pilot attention be first directed to assessing the degree of school-wide interest in PAYE loans. Loan applications should be invited for all potential borrowers. If, as we expect, demand exceeds the limited supply of funds, then the search for appropriate rationing criteria might begin. It seems unnecessary and harmful, however, to prejudge the answers to the question of attractiveness to all by restricting a priori the kinds of loan applications that will be considered.

As an interesting aside, we should point out that Carleton is currently considering our proposal which will move college lending at least in the direction outlined above. It has been suggested that Carleton terminate its own subsidized loan program and encourage students who have provable need to obtain a Federally Guaranteed loan from their local bank. Carleton would operate a limited loan program as a "lender of last resort" but would increase its interest rate from 3% for the first four years and 6% thereafter to a near "full cost" 7%. With the additional funds freed by this maneuver, the college hopefully could continue to meet the ever growing demand for loanable funds by its students and possibly embark on an increased PAYE plan as an alternative to conventional borrowing. This "stretching" ploy, however, will mean that less stringent restrictions on who can borrow will be necessary. Raising interest rates should "ration" funds automatically only

to those willing to pay the higher yields and reduce or eliminate the "fringe" of dissatisfied borrowers who want loans at the subsidized rates but cannot be accomodated with limited funds. With no Carleton subsidy involved, moreover, choosing only the deserving or needy to receive these subsidies becomes less normatively necessary. Finally, as a side-benefit, this change would make college conventional lending more strictly comparable in yield with PAYE lending and make easier a test of the relative attractiveness of the two.

Borrower Information. We have discovered during our research that there is an amazing dearth of accessible knowledge about what type of student borrows and what that student's post-college record is. Several pieces of basic information are imperative for the administration of any student loan program: the amount and terms of the loan obligation, the borrower's address, the name and address of the borrower's parents and references (needed for "tracing" as outlined below), the date the student leaves school or ceases to be exempt from interest accumulation and loan payments.

In addition to the above information, a PAYE-type loan would obviously necessitate the gathering of the borrower's yearly income. Possible predictors of future income such as parental income, grade point average, sex, race, major field and anticipated earnings of present borrowers might also be useful in assessing what type of student has chosen to use the program, how the user's predicted income compares with the national average used in our original computations, and even how the tax rate should be correspondingly adjusted to take account of changes in actual or predicted income prospects. Another useful bit of analysis that could be performed with this data is to determine just how valid a predictor of future income each of these indicators actually are.

Much of this data is (or can be) easily obtained via the original loan application. For the program to be adequately administered, however, much data must be continuously generated and analysed. Actual income patterns of graduate borrowers must be compared with predicted flows to ascertain the soundness of the tax rate and the direction (if any) it needs to be adjusted. These post-graduation income patterns must also be correlated with the income indicators so that any switch in the profile of the "average" borrower can be quickly recognized and appraised and the tax rate adjusted accordingly.

One implicit advantage of a PAYE plan over a conventional loan is that much of this data is naturally generated through the program's administration and would be quite useful for other purposes.

Tracking. A common weakness of student loan administration has been that borrowers become "lost" to the lending institution. Often the borrower's "disappearance" is not due to crafty intentional efforts to avoid debt repayment--but rather of the borrower's naivite of the working of finance and bureaucracies. References, both parents of the borrower, and creditors, enable the lending institution to "skip trace" a person who gets "lost". The skip-tracing mechanism is not foolproof, however, and many borrowers have disappeared. The Department of Health, Education and Welfare, in recognition of this problem, has recently modified its application for a Federally Guaranteed Loan to require three references.

Throughout the administrative function (and especially in tracking) lending institutions have been forced to rely heavily on voluntary borrower cooperation and willingness to assume responsibility for the debt. This reliance is to a certain

extent unavoidable. Student responsibility and cooperation would certainly be enhanced, however, if the borrowers' obligations were completely explained to them shortly before they left school. Hopefully, we can also count on the smallness of Carleton College and (perhaps) the "uniqueness" of the Carleton graduate to lessen this problem for a Carleton program.

Billing. Once the lending institution knows where a borrower lives, it must in some fashion make him aware of the amount of payments he is expected to make. This can be done in a variety of ways. Commercial banks usually ask the borrower what size payments he can comfortably make and generally set a floor of about $30-$35 per month. The payments and the total amount of payments are used along with the 7% interest rate to determine the maturity of the note. The borrower is then mailed a coupon book to remind him of his monthly payments and his loan's maturity.

Carleton followed a similar pattern when it administered its National Defense and conventional loan programs. The school determined a student's accumulated debt shortly before he graduated. The consolidated note was then given a maturity on the basis of the total amount borrowed and the interest rate. Payments were standard at $25 per month (although the student could opt to pay more). The student was asked to sign the note and was sent a reminder in September that repayments were to begin in October.

Collection. After the student is made aware of his obligation, he hopefully will (and usually does) dutifully fulfill the terms of his loan. If he assumes this responsibility, the administrative function effectively ends. All that need then be done is the recording of payments and the issuance of receipts.

Unfortunately, loan obligations are not always satisfactorily met. If this is the case, a lender can try any number of approaches. Commercial banks have been quite flexible in granting 90-day extensions to borrowers who indicate that they cannot make their payments for acceptable reasons (e.g., lack of job). During these extentions the borrower need only pay the interest that accumulates on the loan. If no substantial reason is given for the tardy repayments, however, increasingly strongly worded letters of inquiry are sent to the delinquent borrower. If these letters do not yield a satisfactory response, the party is telephoned. Commercial banks are obligated to do everything short of legal action to obtain due payments. Failing that, they turn the note over to HEW for their guarantee.

Carleton's billing process, on the other hand, consisted only of occasional letters reminding borrowers of tardy payments. While there is a general feeling among Carleton administrators the school's borrowers are more willing to fulfill their obligations than the average, these sentiments are not strongly supported by empirical evidence. Under the old billing and collection system repayments were not being made on over one-fourth of the outstanding notes (excluding legitimate deferments).

In order to "beef-up" this billing and collection process, Carleton recently turned over these portions of their administrative function to American National Bank of Chicago. For a fee of 9 /year for each account handled, American National is required to send out monthly bills, increasingly harsh letters of reminder and inquiry to tardy payers and make telephone calls to "hard-core" cases. If these collection steps fail, American National will turn the case back to Carleton for advice.

Sanctions. A student loan is a legally binding financial obligation and is generally co-signed by the borrower's parents. Conceivably, any defaulted notes could be turned over to a collection agency for action. This course is rarely (if ever) taken. Commercial banks simply turn their bad notes over to HEW for a refund. Carleton simply allowed the debt to remain on the books and hoped that someday the borrower would repay his debt.

Defaults on student loans in commercial banks tend to run about one percentage point higher than conventional installment loans. A source in a Minneapolis bank attributed this higher rate to three factors: 1) a higher death rate among borrowers (due to a higher suicide rate and Vietnam war casualties), 2) bankruptcies, and 3) a higher "loss ratio" of borrowers.[20] All that can be said about #1 is that an institution instituting a PAYE loan will have to make s small charge to cover the necessary insurance. A case can be made for there being greater ease in tracking Carleton students and for a probable mitigation of the bankruptcy danger due to the loyalty and financial success of the average Carleton graduate. However, the "no repayment" data mentioned above indicate Carleton would have only a small and untested advantage over large, commercial lenders in these respects.

Administering a PAYE Program

Administering a PAYE type loan program would involve all the processes and problems found with a conventional loan program. Because of the income contingent nature of a PAYE loan and its generally longer maturities, the administrative function of a PAYE plan would have several complications not found in its conventional counterpart.

The first and most obvious problem is determining what the borrower's payments would be each year. Under a conventional loan, a lender knows what his monthly payments are for the duration of his repayment period. Under an income contingent PAYE loan, annual payments by definition depend upon the borrower's adjusted gross income for the particular year and will probably change significantly from year to year.

The logical methodology is to remind the borrower annually of his tax-rate (the quoted break-even tax rate times the number of thousand of dollars he borrowed) and have him calculate the amount he is to pay during that year. For a small additional fee it would be possible to allow the borrower to opt for biannual or even quarterly payments. Although it seems that people would be less likely to pay their obligations if they came in lumps instead of regular monthly payments, it must be remembered that the total annual payments under the probably longer term "average" PAYE loan are lower than those under a conventional loan.

Verification of the accuracy of the borrower's reported adjusted gross income and consequent premium payment is a sensitive matter. One possibility to deter would-be "chiselers" would be to require a photostatic copy of the borrower's final tax forms (possibly signed by a Notary Public) be mailed with the payments. It could also be made a condition of obtaining a PAYE loan that the potential borrower sign a "release" authorizing the lender to obtain copies of the borrower's official forms from the Internal Revenue Service. Both of these safeguards have two definite drawbacks: 1) they would be difficult, time consuming and expensive to implement and 2) they would consitute an irritating (to say the least) intrusion in the borrower's private financial affairs. While some device for effective

spot-checking is desirable, it seems inevitable that again the school will have to in large measure rely on the integrity of its alumni to insure that proper repayments are made.

The length of a PAYE loan maturity (35, 30, 20, or 10 years as opposed to a conventional loan's maximum of 10) poses additional administrative problems. The cost of billing (postage, secretarial labor, forms, etc.) is naturally increased with the lengthening of the payback period. As we will demonstrate later, these additional variable costs, however, are adequately covered by the 1% we have added to our borrowing costs throughout this work.

The extended PAYE maturities present a more serious (and less easily estimated) problem for the tracking process. Keeping track of a borrower for 35 years is a far more difficult task than doing the same for only 10 years. The borrower will in all likelihood move several times, his parents and references will move and/or die and the amount of necessary bookkeeping will continue to grow more cumbersome. Once again, however, a relatively small institution like Carleton should be able to trace its borrowers far more easily than a commercial bank or a large university.

Yale's Administrative Experience[21]

Yale University has committed itselt to a rather extensive PAYE Program starting in the fall of 1971. As a result, they have assumed the leadership in dealing with the problems involved in instituting and administering a PAYE scheme. Other schools contemplating a PAYE program can learn much from what Yale has done, and Yale's efforts should prove to be exceptionally beneficial in the form of reduced administrative costs for other schools.

Yale is completely administering its own program. It presently has a fulltime staff of seven working in an independent PAYE office. Eventually, the PAYE office will be subdivided into three departments: 1) tuition advising, 2) alumni affairs, and 3) research and evaluation. Tuition advising is roughly comparable to what we have called the "granting of loans". The alumni department will handle the informational, billing and collection facets of the program. The research department will analyse borrower profiles, actual income patterns, general student and public attitudes and formulate on-going plans.

The computer-related "start-up" costs discussed at length in the following section have not proven to be Yale's most bothersome and expensive problem. These operational considerations are being handled through the University's own computer and staff.

Yale, however, has spent approximately $100,000 in the area of "start-up" legal research. There are several problems that have necessitated such large initial outlays for legal services. The following is a sample of the most serious of these problems:

1) The Federal Trade Commission requires that the borrower be made aware of how much he ultimately will have to pay on his loan. Under a PAYE plan, this figure depends, of course, upon the borrower's anticipated income profile. In order to satisfy the FTC's "truth-in-lending" proviso, Yale has had to provide the illustrative income patterns (and resulting payments) that were employed in calculating

its "break-even" tax rate. Such simulations, predictions, and calculations had to be approved by the FTC. The Commission must also approve all printed documents and forms related to PAYE.

2) The terms of the borrower's contract have to be made legally binding. Besides FTC approval, Yale has faced two distinct concerns in this area:

a) Determining the necessity of having contracts signed by minors (during their undergraduate years) cosigned by parents or guardians.

b) Insuring that legal action against delinquent borrowers can be taken under Connecticut state laws. The contract must be written in such a manner that "Choice of Law" considerations do not prohibit effective legal collection efforts in states outside Connecticut.

3) The Internal Revenue Service has to make rulings on two specific matters:

a) Whether it is acceptable for the lending institution to secure a "release" from the borrower authorizing the lender to have access to his official IRS file. Such access is vital to verifications efforts.

b) Whether interest payments on PAYE loans are to be tax deductible. Yale, in a maneuver designed to provide relief for the borrower (and consequently make the program more attractive), is attempting to convince the IRS to allow all early (and small) payments to be credited strictly to the loan principal. If this method is found acceptable, it would mean that the later and much larger PAYE repayments would be definitionally applied only to the "interest" and would be totally tax-deductable.

Each (and more) of these legal problems must be dealt with before a PAYE program can safely begin. Yale's "ground breaking" work in this area can be of considerable benefit to interested schools. After many drafts, Yale has designed borrower contracts and application forms that are acceptable to the FTC and, with regard to the contract, legally binding. The school is pressing the IRS for a ruling on the interest issue that, once given, will be generally applicable to schools using PAYE.

All this is not to say that Yale's legal work has pre-empted the need for such endeavors on the part of a specific school. On the contrary, any school seriously contemplating the innovation of a PAYE scheme will be forced to "cover" itself by doing the work necessary to insure that the specifics of its own program are legally adequate. Nevertheless, Yale's efforts can drastically reduce the "start-up" costs necessitated by legal problems.

Yale undoubtedly has learned a great deal about PAYE and its problems by actually working through the processes involved in setting up a functioning loan program. The University periodically holds seminars on PAYE. During these meetings, Yale shares the benefits of its experiences and elicits outside suggestions and comments.

Unresolved Problems

Determining who could (or can!) administer a PAYE program is a thorny problem, but a hopefully solvable one. As previously mentioned, Carleton has recently turned over the administration of its conventional and National Defense student loans to the American National Bank. The bank has a completed and modified computer program equipped to handle the billings involved in these common types of loans. It has a trained and competent staff to efficiently handle the collection process. The first possibility that needs investigation is the turning over of the PAYE administration to the American National Bank or a comparable institution.

Economics of Scale and High Fixed Costs. Unfortunately, these firms are not presently equipped or willing to begin handling this type of loan program. There are large start-up costs (at worst $150,000-$200,000) involved in setting up the mechanics required to undertake such a program. Computer space has to be used, the machine programmed, the forms designed and purchased, a collection staff hired and trained, and most importantly (in Yale's experience) the legal problems defined and solved.

Large commercial banks were willing and able to profitably undertake such a program of National Defense and conventional loans without excessive cost to any individual school. These types of loan agreements were quite common throughout the country and the "billers" could reasonably anticipate a strong demand for their services once they were operational. Legal problems had long ago been defined and solved. They also recognized (and capitalized upon) the possibility of "selling" their national service to many schools once the mechanism had been established. As a consequence these high fixed start-up costs were borne initially by the banks and were later "spread" over a large number of schools. The "professional" billers, in turn, now view the administration of these loan programs as profitable endeavors and, with their large start-up costs already sunk, are eager to expand the market for their services.

Such an approval may not be feasible with a PAYE plan. The concept, while eliciting much interest and discussion in educational circles, is not presently being used widely. To the best of our knowledge, only two schools are committed to trying it this fall. Banks are understandably reticent to sink a large amount of money into a program for which there is still only a "potential" market and one in which there is no assurance that these start-up costs can be spread widely. In order to make banks begin serious investigation into the feasibility of providing such a service, several schools would have to express concrete interest. Fortunately, the number of schools necessary for a bank to become involved could be considerably reduced if the banks come to believe that PAYE plans were the "coming thing" in the financing of higher education and that by perfecting a satisfactory system of administration they could encourage other schools to enter such a program. This consideration is probably the major argument for a consortium approach to initiating a PAYE plan.

Whether the necessary conditions for commercial bank involvement in PAYE administration will evolve in the immediate future requires foresight and speculation beyond the authors' competence. If we assume, however, that these conditions will not be found or that a viable consortium cannot be formed, any school contemplating an early institution of a PAYE plan will face the real problems of finding some way to administer the program--at least in the interim before commercial banks become interested--and to bear these high fixed start-up costs.

We do not wish to inject an excessively pessimistic note with these observations

on administrative start-up costs--only to provide a warning. It seems hardly reasonable that a sound program with the thorny problems of borrower utilization and lender risk and uncertainty already solved and with other administrative costs covered by our 1 percent administrative cost assumption, should be torpedoed for want of $150,000-$200,000. Tax rates might be raised still higher for early users of the program. Given that legal costs are a major part of the start-up costs and that the legal problems have been resolved already by Yale, these costs can be significantly reduced because much of this information could be obtained "free of charge". Yale is currently conducting seminars in PAYE lending, and presumably this legal information is available to all. The surprisingly difficult problem of a legally acceptable loan agreement, for example, is solved for any "second generation" lender since Yale openly offers copies of its agreement to any potential lender. Finally, we wish to emphasize that the remaining part of the approximately $175,000 start-up costs are computer related (roughly $80,000-$100,000), and we have a home grown "guesstimate" that similar start-up functions could be performed by Carleton at a significantly lower cost, i.e., $5,000-$10,000.

Carleton has excellent and underutilized computer facilities available at no obvious cost. The necessary programming could be done (we understand) by an "ace" student programmer over one summer at a cost of less than $2,000. Sufficient forms for a small program could be devised and purchased for comfortably less than $500. Given adequate and "free" computer facilities and the availability of low-cost student programmers, the computer-related start-up costs of an administration program at Carleton would probably not be higher than the excessively optimistic $8,000 guesstimate of the Carleton computer center. They certainly would be well below the $80,000 to $100,000 figure we were quoted.

Start-up costs probably are not the only "lumpy" fixed costs involved in the administration of a PAYE program. The on-going billing and collection processes may be difficult to justify economically for small scale programs. At least one competent and fairly knowledgeable person would be needed to do the billing, ascertain somehow the validity of the reported income figures and send out the necessary collection letters. Once this person were hired and trained, his salary would become a fixed cost. He would have to be paid whether he handled 20 or 2,000 obligations. There would be an optimum number of claims this person could handle (one estimate was 3,000). Any number less than the optimal figure and the personal labor would not be used efficiently; any more, and the school would have to hire another person. This "step" cost function in the billing and collection facet of administration is another argument for some sort of consortium approach.

In short, there are considerable problems involved in initiating a program to administer a small PAYE program. Commercial banks are hesitant to enter the market until they can be fairly certain that the economies of scale that make their operations profitable can ultimately be realized through a large volume of PAYE loans (i.e., many schools involved). Small institutions, although in a unique position with regard to computer time and space and the availability of student programmers, must still reckon with these economies of scale if they choose to administer the program themselves. A consortium would clearly ease these problems of administration.

An alternative to commercial banks, individual schools, and even consortia bearing the large fixed start-up costs is to interest an innovative foundation in financing the creation of a workable administrative scheme for PAYE. Such a foundation, working through a college, a commercial bank, or even facilities of its

own, could finance or develop a valuable program to meet a pressing need in higher education. Once completed, the foundation's scheme could be used at little cost by schools desiring to attempt a PAYE scheme. The creation of a "Foundation X PAYE Administration Program" would remove a substantial roadblock to the initiation of a PAYE plan on a wide scale.

Minimum Loan Sizes. Assuming some means can be found to solve the above-mentioned problem of high fixed start-up costs, the on-going costs of that function would have to be determined and "covered" by our one percent differential between borrowing costs (6 percent) and PAYE yield (7 percent). Determining these costs is an easy matter if an outside biller is chosen to administer the program since most billers charge a standard flat rate, roughly $9, per account handled. If this is the case (i.e, if someone else can be found to administer the program), a clear and persuasive argument can be made in support of a floor on the size of loans. Carleton covers its administration costs essentially by charging a higher tax rate per dollar lent and revenues therefore are not related to the number of notes. It will therefore make more "extra" or "covering" dollars on a large loan than it will on a small one. Conversely, the additional dollars from the increased inflows from a small loan could conceivably not cover the administration costs involved in that loan.

Yale has chosen $500 as the minimum loan size (per year) for each borrower. Although we have no conclusive figures to support our belief, we consider this a reasonable floor. In any case, our questionnaire results indicate that the students who want to borrow usually want to borrow more than $500 anyway. An upper limit on loan size need be set (at least in the Pilot Program) only to maximize the number of borrowers and consequent information obtained from the experiment.

On the other hand, if the fixed start-up costs of administering a PAYE program have to be borne internally (either by Carleton alone or through a consortium) and if Carleton has hired the one "experienced biller" (capable of handling 3,000 accounts) the argument for a minimum loan size loses some of its strength. Once the cost of setting up such an operation has been "sunk", the school (or the consortium) would find that its extra cost for each additional loan was quite small. In fact, it might even seek to maximize the number of accounts it was to handle--even looking for "outside" programs to administer.

There are, of course, some additional costs involved in the accepting of each new account (up to 3,000) accounts. Forms have to be used, postage paid, etc. While these costs can be significant over a 35-year period, they lurk as only petty cash as compared to the start-up and fixed costs.

Financing the Administrative Function

To conclude, we feel it worthwhile to at least attempt a calculation of the level of administrative "revenue" provided by our one percentage point addition to borrowing costs for "costs of administration". We remind the reader again, that Yale now estimates that its administrative costs exclusive of start-up costs are more than financed by this one percentage point "premium". We have too little information to verify this for Carleton but we can at least estimate how much we can afford to pay to administer the program, and still break even with our previously stated tax rates.

For an on-going PAYE program of a 35 year maturity the addition of one percentage point to borrowing costs results in an additional inflow equivalent to $8340 per year. This figure was calculated only through the year 2000; if we had calculated it for a later date the annual amount would increase but so too would the number of borrowers and assorted costs. Of course, in the early years of the program administrative costs would far exceed the revenues from the very low (early) level of repayments. The $8340 figure, however, in effect assumes that the difference is borrowed, and accumulated interest plus principal is repaid out of the excess of revenues over costs in the later years of the program.*

To put this figure in perspective, we should indicate that it could finance (again, exclusive of start-up cost) nearly 2,000 accounts every year of the program at the American National Bank's $9 per account standard cost. The average of the number of accounts outstanding over the 20 years of a program lending $100,000 each year (in real terms) is unlikely to be significantly above that 1000 figure. Carleton now has only 400 accounts outstanding with a roughly similar sized on-going conventional program.

For the PAYE pilot the annual amount of administrative revenues would be a smaller $3059 which could finance approximately 340 accounts each year. This somewhat smaller amount, of course, should be assessed in light of the much smaller total (four year) amounts that would be lent in a PAYE pilot. If all $250,000 were lent to this "administrative breakeven" number (340) of borrowers, this would imply a total per student loan obligation over four years of borrowing of approximately $735. This, in turn, is about $200 more than the average size loan (accumulated over four years) of the current Carleton lending program. In short, given administrative start-up costs can be covered elsewhere, there should be no difficulty financing the remaining administrative costs of the pilot out of pilot repayments.

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*Our methodology was to first determine the sum of the present values of additional repayments needed to cover a rise in borrowing costs from 6 to 7 percent administrative costs through an upward adjustment in tax rates. We then found the annual amount of an annuity that yielded that sum of present values.

Chapter V

CONCLUSIONS

We have now covered as many of the questions we introduced in the introduction as feasible given the limitations of our time, knowledge, and imagination. We feel we have hardly made an unambiguous case for the introduction of a full and on-going PAYE plan at Carleton. However, we have limited considerably, we hope, the number of unknowns in making that decision and have suggested one way of limiting them still further: a Pilot PAYE Program.

We feel that as a first step in introducing any kind of PAYE plan, whether pilot or on-going, the college must decide whether student lending either PAYE or conventional is an appropriate activity for an educational institution. In making that decision we have suggested that it recognize: 1) that the current student loan market is far from perfect and that even students willing to borrow under conventional terms are often not able to acquire funds;* 2) that any college lending program, PAYE or conventional, will require upward adjustments in the volume of new loans if it is to keep apace with rising student needs; 3) that it will generate large accumulation of debt and associated risks and uncertainty; 4) that this debt is decidedly not like debt generated from deficit-spending since it is backed by associated student promissory notes; 5) that the risks of expected or known fluctuations in payments and receipts can be insured against by appropriate changes in the administration of other college funds and by associated increases in interest costs charged student borrowers, but 6) that the likelihood of unexpected fluctuations in payments and receipts, i.e. truly uncertain prospects, may be found unacceptable by an institution whose principle activity is hardly advancing risk capital.

We would also suggest that this decision whether to lend at all be made coincident and in consultation with potential sources of finance for a (hypothetical) lending program. The degree of risk and uncertainty involved in any college lending obviously depends on the amount of risk-sharing the ultimate sources of funds will permit. The college, in addition, should keep abreast of federal legislation in this area. At the least, it is possible that pending legislation will create and support a secondary resale market in student loans whereby institutions holding such assets can market them in time of need with relatively low risk of capital loss. Finally, foundation support might also be available.

Presuming a favorable decision regarding "college lending at all" the next step would be to determine whether PAYE or a conventional loan is the appropriate vehicle. In this decision we would suggest that the major consideration be the

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*The great bulk of all educational loans are either NDSL subsidized loans or federally guaranteed bank loans. All of these apply a "needs test", require a promise to utilize the loan "only for educational purposes", require the student to justify the size of his loan by contrasting funds sources with educational costs, place ceilings ($1,500 per year and $7,500 in all years) on loan requests, and require certification of this information by the school's financial aid office. While all of these are "reasonable" tests, they are, strictly speaking, imperfections in the educational loan market and decidedly limit availability. All of this says nothing, of course, of the additional restraint of the apparent bank disinterest in actively soliciting such loan requests.

following: will the college find the greater uncertainty associated with PAYE lending and the high administrative start-up costs more than offset by the greater willingness of students to borrow under PAYE than conventional loans? We feel there is sufficient evidence that the basic conceptual justification for PAYE is valid. At least some students who will not borrow to finance rising educational costs under conventional terms will borrow under income contingent PAYE terms. It is presumably these students, failing other sources of finance, who would choose not to attend college at all or, more likely, would be lost to other institutions with lower costs. We also know, however, that providing the student an opportunity to borrow under PAYE terms will expose the lender to "at least some" additional uncertainty in repayments flows and at least some rise in loan administrative costs. It has been our unfortunate inability to give appropriate weights to these three factors which has limited our ability to make an unambiguous case for college PAYE lending.

This has also been the basis for our recommendation that Carleton design a pilot PAYE "experiment" to generate the kinds of information needed to "weight" these factors at least cost to the institution. Such an experiment should, quite quickly, determine whether students would prefer to borrow under PAYE as opposed to conventional terms and give an accurate notion of the number of students who would find it relatively more attractive. It should also quite quickly indicate the kinds of special administrative problems and associated increased costs involved in PAYE lending. It will probably not eliminate, however, all uncertainty over repayment flows in such a short time, but may generate some confidence in our ability to handle these unexpected fluctuations.

We do not wish to detail here the specifications of a pilot project. However, we have alluded throughout the paper to its broad outlines and can at least summarize these:

1) New lending under the project should be limited in size and duration to, in turn, limit the information costs of the program. As a working model we have suggested a four-year pilot lending $25,000, $50,000, $75,000, and $100,000 in each of its four years.

2) Repayments would be based on the student's first full year 9-12 months of reported income and be made the year after that income is earned as close as possible to the time when he is filling out income tax forms.

3) In our breakeven tax rate calculations, we have made it a matter of indifference whether or not the student is allowed to defer repayments while in graduate school or the Armed Services. Breakeven tax rates were calculated as if the student were repaying while in graduate school, i.e., our average initial income figure included incomes of those not fully embarked on their careers. On the other hand, we pointed out that the costs to Carleton of permitting delays in repayments would be at least equally if not more than offset by having initial repayments based on higher (later) inflation-increased incomes. In short, the student might well be offered the option of either delaying repayments or beginning repayments immediately (after being advised of the trade-off between deferring repayments and paying [later] on the basis of higher initial incomes).

4) Women, we have assumed, if unmarried would repay on the basis of their own income or if married, on the basis of one-half of their joint income or of their individual income, whichever is higher.

5) Students should be allowed a choice between a range of maturities (and tax rates) with the institution, if necessary, exercising some added effort to reduce average maturities from their currently common 35 year term. This, we have argued, will probably be merely acceding to student preferences, will reduce the debt accumulation (liquidity) differentials between PAYE and conventional lending, should reduce any undesirable cross-effects between PAYE repayments and alumni giving, and may reduce administrative tracking costs.

6) We have proposed break even tax rates of .0042, .0048, .0075, and .0171 to be quoted students choosing 35, 30, 20, and 10 year maturity programs, respectively. As added insurance against lender risk and uncertainty these might be increased by several one-hundredths of one percent as well. We would also suggest that the student be strongly reminded that these tax rates imply if he enjoys an "average" earnings experience that he will pay an approximately 7 percent yield on his loan just covering Carleton's borrowing costs, administrative costs, and the costs of risk and uncertainty.

7) We have also proposed that these tax rates not be adjusted downward to take into account borrowers' rising initial incomes at least during the pilot's four year duration. This, we have argued, would raise our average effective yield on lending to all four year's of borrowers to approximately 7.5-8.0 percent and represents yet additional insurance against lender risk.

8) We have assumed (although taken little account of in our income predictions) an exit provision similar to Yale's which produces automatic borrower exit when the borrower's repayments (still based on income) have totalled at any point in time 150 percent of the amount borrowed (principal) plus interest accumulated on the unpaid balance at 7 percent. We have argued, however, that the exit provision might be better understood and accepted by borrowers if it were instead presented as a maximum (penalty) interest rate that the student could be expected to pay, e.g., 10-11 percent, plus the principal amount borrowed (with no penalty). If this latter approach were taken, however, it would have to be recognized that exit or opt-out would be "easier" in the earlier years of repayment than under Yale's 150 percent of the amount borrowed approach which tends to "lock in" students during the first years of the program and postpones potential opt-out until somewhat later.*

9) We also have assumed throughout this paper that all funding for the program would be external and that the pilot program would generate fairly substantial accumulations of outside debt. Carleton, we suggested, must seek a commitment from the ultimate source of funds for an initial $268,000 during the first four years of the program and a fairly high assurance of refinancing of the original debt plus accumulated interest (less repayments) over a longer period beyond the date of first lending. Since we were unable to predict the ultimate maturity composition of our loan portfolio to say nothing of repayment shortfalls or changes in borrowing costs, we can hardly give hard estimates of the amount of refinancing necessary over the whole life of the pilot. As an illustrative pattern, however, we simulated

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*This is because the 50 percent of principal penalty looms much larger than a (penalty) 11 percent of interest accumulated on the unpaid balance in the early years of repayment. Not much penalty interest will have accumulated over only, say, five years whereas a 50 percent of principal penalty discounted for only five years represents a much larger effective yield.

a 35 year maturity program with no short-run deviations from our predicted paths which required outside refinancing for 29 years after the date of first lending and a maximum of outside funds of $510,000 in the 23rd year. This contrasted with a ten-year program with a maximum of $305,000 in debt in the 6th year after first lending and zero debt in the 19th year after first lending.

10) Carleton, of course, should also seek the maximum possible risk-sharing with the ultimate source of funds. We suggested that this problem had essentially two aspects: a) refinancing difficulties associated with temporary short-run divergences from predicted repayment paths but a long-run break even and b) long-run divergences from a predicted repayment path such that the program never break even, i.e., is unprofitable. It is probably reasonable to assume that a commitment could be obtained from the ultimate source of funds to refinance larger than predicted accumulations of debt at (hopefully) unchanged interest charges in the event of temporary downturns in the economy. However, it seems unlikely that anything short of foundation or public support for the program would share the risk of its ultimate long-run unprofitability.

11) Carleton might consider as well some "risk-sharing" with its borrowers in the form of later changes in the tax rate if borrowing costs or income growth rates vary. Changing tax rates with changes in borrowing costs would probably be most easily justified to the borrower, but adding even this element of uncertainty to the student's decision to borrow may be counter-productive in terms of program utilization.

12) Carleton should at least consider some modification of its endowment investment policies in the direction of somewhat greater liquidity if it introduces a PAYE pilot. This decision, we argued, depended heavily on how liquid our endowment was already and how much we felt additional "reserves" were necessary.

13) As we expected (and as suggested by its original proponents) private firms predict that PAYE lending would involve fairly high fixed start-up costs which might render the pilot unprofitable (at our 7 percent yield) unless these costs were spread over a larger number of borrowers than implicit in our limited PAYE pilot. In addition, total operating costs associated with "follow-up appear not to change significantly with the number of borrowers over fairly wide ranges and would be lower per unit, the larger the number of borrowers, i.e., follow-up inputs come in large "lumps". Both of these factors provide the strongest justification we could find for a consortium approach to the program or at the least a fairly convincing demonstration to potential private developers of a PAYE billing program that PAYE lending was "the coming thing" and that the start-up costs need not be borne wholly by a single school. They also suggested a possible avenue for limited foundation support for the program either in the form of a foundation grant to Carleton for developing PAYE billing procedures or a foundation-administered program for the same purpose whose results would be available to all.

14) Failing outside support for these start-up costs, Carleton might also consider a Carleton-financed "educational venture" to develop PAYE billing procedures of its own. While this might raise administrative costs above our assumed one percent of the amount borrowed, it would obviously have desirable external benefits of an educational value and should cost less than a market-oriented program to the extent student programmers could be utilized. Moreover, as we mentioned in Chapter IV, Carleton's computer center expressed considerable confidence in its ability to design PAYE billing procedures at significantly less cost than a private firm.

15) Also as expected, the costs of administration are more related to the number of borrowers than the total amount lent. This suggested some lower limit on the loan size in the order of $500.

16) Finally, we would expect PAYE lending and specifically a pilot PAYE program to incur special administrative costs not shared with a conventional program. Repayment schedules for individual borrowers would be more difficult to prepare and special efforts would be required to calculate and alert borrowers of their right to automatic exit. The (possibly) longer term would imply special "tracking costs". More importantly, however, a PAYE pilot would require special efforts at preparation and analysis of data for the decision to extend the program. We strongly emphasize that cost-cutting in this area would very much subvert the principle goal of the pilot: to provide information.

There is one major unresolved question remaining in pilot design: who should be permitted to borrow in the event loan requests exceed the upper limits on the pilot's size? In our discussion of this problem in the Introduction we emphasized that any rationing criteria might have undesirable effects on the informational function of the pilot and suggested that an increase in amount lent might be more appropriate if there were only a small divergence between loan requests and the pilot's ceiling. If this is not possible, however, we have at least considered several approaches to the problem of loan rationing: 1) the PAYE pilot might be initiated with general availability to the freshman class of 1971-72 with students already receiving conventional college loans continuing to receive the same terms and treatment as in the past. This, we suggested, would unfortunately yield little repayment data for pilot evaluation. 2) The PAYE pilot might alternately, be limited to juniors and seniors, again on a general basis. This, however, would limit our ability to measure PAYE's impact on admissions. 3) Finally, a needs test might be applied. One suggestion, for example, was to choose PAYE borrowers out of a pool of college loan recipients who have met whatever criteria the Office of Student Aid applies to college loan applications. The college loan recipient would postpone his decision on the form his repayments would take until just before graduation when he could elect to repay either on a fixed interest or an income-contingent basis, whichever he found most attractive. While this would provide a neat format for a clear comparison between the relative attractiveness of PAYE versus conventional loans, the validity of these results and any income data generated would be limited only to that special borrower, the financial aid recipient.

This latter approach introduces yet another problem. Clearly, PAYE in any form will be competing with conventional college loans which are at Carleton of significantly lower yield. The current college loan, for example, provides a large interest subsidy for the years immediately after graduation and never charges more than 6 percent. It would be surprising that even were income-contingent repayments very attractive to the borrower, he would choose a 7 percent PAYE loan over a 5-6 percent subsidized college loan. This suggests either that Carleton stop subsidizing its conventional loans or that it <u>separate</u> conventional loan recipients who must meet needs tests from PAYE loan recipients who need not meet a needs test.

Finally, we wish to conclude by reminding the reader that presumably Carleton is providing no "special favor" to the applicant in granting a PAYE loan. At its base, the PAYE loan is seen as a vehicle for facilitating the transfer of private capital funds from alternate uses which earn 7 percent to <u>all</u> student borrowers

who are willing to pay 7 percent (on the average!). Currently, it is argued, neither borrower nor lender willingly engage in the voluntary exchange of IOU for current funds which makes this transfer of private capital possible because of the default risks imposed by archaic repayment terms. Consequently, what student loans exist now are subsidized, are treated as a "social service" by the lender, and are often rationed according to need. PAYE, by offering an innovative, new form of repayments would presumably reduce or eliminate this technical problem of borrower and lender risk, thereby attract new private capital to educational finance, make Carleton and other schools make it more accessible to anyone who finds educational self-finance attractive whatever the reasons, and as a side benefit would eliminate the need to apply any other criteria than single willingness to pay in determining who receives a loan.

It seems hardly reasonable given this broader context to limit pilot loans only to the "worthy" if this would in any way prejudice the decision to extend the program later to all (willing) borrowers. To be sure, new pilot loan funds might have to be limited vis-a-vis demand and one would like to allocate them to the most deserving. Moreover, current college loan funds allocated as "financial aid" will soon be deficient and many will view the injection of new PAYE pilot funds as an (unfortunately) temporary means of raising loan aid to the needy. However, considerable thought must be given to assuring that these short-run considerations not over-ride the basic goal of the pilot to "prove" whether educational self-finance to all comers through income-contingent loans is possible and desirable. And as a final warning, we should remind the reader that the potential borrowers not found "needy enough" to receive a Carleton PAYE loan by outside assessors of need still have the ultimate option: not to attend Carleton at all.

In view of these considerations, we would offer a final operational suggestion: let us first offer PAYE to all comers willing to pay the "full cost" 7 (or 8-10) percent "average" yield to get as accurate a reading as possible of schoolwide interest. If this results in "excessive" borrowing requests by contrast to the limited funds, then Carleton can worry about the appropriate rationing criteria.

APPENDIX I

QUESTIONNAIRE

PRE-SCRIPT: Your response is vital for the success of this questionnaire. Please, if at all possible, help by spending a few minutes filling it out. It doesn't take more than 20 minutes - one-half hour.

INTRODUCTORY LETTER

Dear Random Sample:

We, a group of junior Carleton economics majors, are doing an independent study this spring on the problems and alternatives of financing higher education. One of the most interesting proposals we have encountered in our studies is the Pay-As-You-Earn (PAYE) plan. We've prepared this questionnaire in an attempt to measure the acceptability and attractiveness of such a scheme for Carleton students.

Please take the time to carefully read, consider and answer the enclosed questionnaire. Should you have any questions concerning the mechanics of the plan (or anything else contained herein), please contact any one of us.

After completing the questionnaire, return it in the envelope in which you received it via campus mail to PAYE PLAN c/o Economics Department. The envelope (with your name on it) is only to insure a complete return. Complete anonymity is assured and all individual replies will be kept in strictest confidence.

Sometime after your questionnaire has been returned, one of us would like to talk with you informally concerning your general reactions to the plan.

We hope that our requests do not unduly inconvenience you and that you will find the PAYE plan as interesting as we do.

Marv Johnson x362
John Cunningham x354
John Trucano x205
Jon Arneson x307

DEMOGRAPHIC INFORMATION

Before considering the plan itself, we need some general information about you and your plans.

1. Age _____

2. Sex: ☐ Male ☐ Female

3. Class: ☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior

4. Major or intended major (circle one)

00. Completely undecided

Humanities	Sciences	Social Sciences
10. Art	20. Biology	30. Economics
11. Black Studies	21. Chemistry	31. Government
12. Classical Languages	22. Geology	32. Psychology
13. English	23. Mathematics	33. Sociology-Anthropology
14. History	24. Physics	34. Other
15. Modern Languages	25. Astronomy	
16. Music	26. Other	
17. Philosophy		
18. Religion		
19. Other		

5. Carleton Grade Point Average _____

6. Please complete the following chart.

Number of siblings		Ages
_____	Have attended college	_____
_____	Are attending college	_____
_____	Likely to attend college	_____
_____	Not likely to attend college	_____

7. What (to the nearest thousand) do you estimate your family's income to be? _____

8. Who made the decision for you to come to Carleton?

☐ You alone

☐ You and your parents together

☐ Your parents alone

9. To the best of your knowledge, what are your career plans?

10. What amount do you anticipate earning

    a. during your first five years after graduation? _____

    b. during your "peak" year? _____

PRESENT FINANCING

1. a. Are you presently receiving financial aid from Carleton?

    ☐ Yes ☐ No (if "no", go to question 2).

    b. Indicate the significance of Carleton's financial aid award in persuading you to attend Carleton.

    very insignificant very significant

    -2 -1 0 1 2

    c. After you had been accepted by Carleton, did you have to decide between coming to Carleton and some other course of action?

    ☐ Yes ☐ No (if "no", go to question 2).

    d. If you had not come to Carleton, what would you most probably have done?

    ☐ Attended a state supported college or university.

    ☐ Attended a private college or university

    ☐ Other (go to question 2).

    e. This alternate college or university would have:

    ☐ had lower net costs*

    ☐ had equivalent net costs

    ☐ had higher net costs

    *(Net cost = Room + Board + Tuition + Expenses - Total Aid)

2. How did you finance your Carleton education this year? (Please round to the nearest $100).

Carleton grant		_____
Carleton loan		_____
Carleton work contract		_____
Family contribution		_____
Personal savings		_____
Summer work		_____
Other (please specify)	_____	_____
	_____	_____
TOTAL		$4100

3. Last year Carleton raised its comprehensive fee $250. Each of us was compelled to find some combination of additional funds to return to school this fall. Those of us who are here obviously succeeded in our search. How much of the additional $250 did each of the following sources supply?

Carleton grant	_____
Carleton loan	_____
Carleton work contract	_____
Family contribution	_____
Personal savings	_____
Summer work	_____
Other (please specify) _____	_____
	$250

4. Commerical banks offer loans to college students to help them finance their education.

   a. Have you or your family ever secured or considered securing such a loan?

      ☐ No (go to part d)

      ☐ Have considered borrowing (go to part c and d)

      ☐ Have borrowed

   b. To the nearest $100, how much did you borrow? _____

   c. For what reasons did you secure or consider securing this loan?

      ☐ To reduce work contract

      ☐ To reduce summer work

      ☐ Insufficient funds from other sources

      ☐ To make it possible for a younger brother or sister to attend college

      ☐ Other (please specify) _____

   d. Should a loan ever be required to finance your education, who would assume responsibility for repayment?

      ☐ You alone

      ☐ You and your parents

      ☐ Your parents alone

A DESCRIPTION OF THE PAYE PLAN

Another means of financing the increasing costs of higher education has been proposed. It's called the PAYE (pay-as-you-earn) plan. The PAYE plan

will be tried at Yale and Duke next fall and is being seriously considered at other schools. Below is a simplistic, hypothetical notion of one way it could work.

A student could annually "borrow" (have credited to his account) an amount between, say, $500 and $1000. Repayment of the loan would be deferred until the student completed his education and then would be repaid over 35 years in yearly installments of 4/10 of 1% of the borrower's adjusted gross annual income for each $1000 borrowed.

Ken Baseman has prepared the following table to give an approximate idea of annual repayment expenses.

Numbers in Table represent annual payments.

Annual payments = .4% x Borrowed Amount in $1000 units x Annual Income

Annual Income \ Total Amount borrowed (in $1000's)	1	2	3	4	5	6	7	8	9	10	15
7250 and under	29	58	87	116	145	174	203	232	261	290	335
10000	40	80	120	160	200	240	280	320	360	400	600
15000	60	120	180	240	300	360	420	480	540	600	900
20000	80	160	240	320	400	480	560	640	720	800	1200
25000	100	200	300	400	500	600	700	800	900	1000	1500
30000	120	240	360	480	600	720	840	960	1080	1200	1800
40000	160	320	480	640	800	960	1120	1280	1440	1600	2400
50000	200	400	600	800	1000	1200	1400	1600	1800	2000	3000
75000	300	600	900	1200	1500	1800	2100	2400	2700	3000	4500
100000	400	800	1200	1600	2000	2400	2800	3200	2600	4000	6000

As the Yale brochure describing its PAYE Plan states: "Earlier forms of financial aid will remain available on the same terms and by the same standards of eligibility and limits as now exist. The option of the PAYE plan would be available to all; there would be no stipulation of provable "financial need."

It seems that participation in this plan would tend to "soak" someone who met with great financial success. However, this person is protected by the "opt out" or exit provision of the plan which terminates his obligation to the school after repayment of 150% of the amount borrowed plus accumulated interest. Death of the participant also would terminate this agreement.

For a student who marries, the annual income upon which repayment is based would be the borrower's own income or ½ of the couple's joint income, which ever is greater.

The PAYE plan has all the advantages of conventional borrowing; most obviously it could provide funds to meet the rising costs of a college education. It could also be used to reduce the financial burden on your parents and to help them in sending a younger brother or sister to college. It might even be used to finance an expensive off campus study program.

However, the PAYE Plan has the special advantages of a variable repayment scheme. A student would repay the loan on the basis of his earnings (and thus his ability to pay). This feature reduces the restriction of job choices a graduate faces; ie a graduate need not take a high paying job in order to make his loan repayments. Finally, because repayments are spread over such a long period each annual payment would be very small by comparison with a conventional loan.

UTILIZATION AND ATTRACTIVENESS

1. a. If a PAYE plan had been available to finance the $250 tuition increase last fall, I would have: (circle one)

definitely not used it — definitely use it

-2 -1 0 1 2

b. What sources of funds would you have been most likely to replace? (please rank; "1" most likely, etc.)

_____ Carleton loan
_____ Carleton work contract
_____ Family contribution
_____ Summer work
_____ Personal savings
_____ Other _____
_____ _____

2. Assume that tuition was going to be increased by $300 next year and that the amount of Carleton's aid to you remained unchanged.

a. I would: (circle one)

definitely not use the PAYE plan — definitely use the PAYE plan

-2 -1 0 1 2

b. If I did decide to take advantage of the PAYE plan, I would like to defer $_____ (up to $1000)

c. What sources of funds would you look to in the event of such an increase? (Please rank according to attractiveness; "1" most attractive, etc.)

_____ Carleton loan
_____ Carleton work contract
_____ PAYE plan
_____ Family contribution
_____ Summer work
_____ Personal savings
_____ Other (please specify) _____

3. Indicate your reactions to the following features of the PAYE plan: (Please circle)

	Very unfavorable				Very favorable
a. Length of repayments (35 years)	-2	-1	0	1	2
b. Size of repayments (see Table)	-2	-1	0	1	2
c. Size of repayments not fixed but based on earnings	-2	-1	0	1	2
d. Availability unrelated to need	-2	-1	0	1	2
e. Freedom from parental influence	-2	-1	0	1	2
f. Help a younger brother or sister go to college	-2	-1	0	1	2
g. Other_____	-2	-1	0	1	2

4. Would you consider financing an off campus study with a PAYE loan? (Circle one)

Definitely not — Definitely

-2 -1 0 1 2

5. Whether or not you would utilize a PAYE plan, indicate your reaction to its availability at Carleton. (Circle one)

Very unfavorable — Very favorable

-2 -1 0 1 2

6. Indicate your parents' probable reaction to your utilization of a PAYE plan.

Very unfavorable Very favorable

-2	-1	0	1	2

Any additional comments you may have would be greatly appreciated:

APPENDIX II

QUESTIONNAIRE TABLES

Table 1

Return, Sex + Financial Aid Profiles of Legitimate Sample By Class

Class	Number Sent	Number Returned/%	Females/%	Males/%	Number on Financial Aid/%	Number not on Financial Aid/%
Freshmen	100	32/32	10/31	22/69	15/47	17/53
Sophomores	100	38/38	11/29	27/71	18/47	20/23
Juniors	100	49/49	10/20	39/80	24/49	25/51
Seniors	100	46/46	13/28	33/72	22/48	24/52
TOTAL	400	165/41	44/27	121/73	79/48	86/52

Table 2

Utilization Last Fall By Class, Sex + Financial Aid Status

	Seniors/%	Juniors/%	Sophomores/%	Freshmen/%	Males/%	Females/%	Financial Aid/%	Non-Aid/%	Total/%
-2	18/39	17/35	12/32	NA/NA	36/36	11/32	13/20	34/49	47/35
-1	5/11	5/11	3/8	NA/NA	8/8	5/15	3/5	10/15	13/10
0	7/15	13/26	7/18	NA/NA	22/22	5/15	16/25	11/16	27/20
+1	8/17	3/6	10/26	NA/NA	13/13	8/24	4/22	7/10	21/16
+2	8/17	11/22	6/16	NA/NA	20/20	5/14	18/28	7/10	25/19
TOTAL	46/100	49/100	38/100	NA/NA	9/100	34/00	64/100	69/100	133/100

Table 3

Utilization Next Fall By Class, Sex + Financial Aid Status

	Seniors/%	Juniors/%	Sophomores/%	Freshmen/%	Males/%	Females/%	Financial Aid/%	Non-Aid/%	Total/%
-2	NA/NA	13/26	7/18	8/25	18/20	10/32	4/7	24/39	28/24
-1	NA/NA	6/12	6/16	4/12	10/11	6/19	7/12	9/14	16/13
0	NA/NA	10/20	6/16	4/12	15/17	5/16	12/21	8/13	20/17
+1	NA/NA	7/14	11/29	9/28	21/24	6/19	15/26	12/19	27/23
+2	NA/NA	13/26	8/21	7/22	24/27	4/13	19/33	9/14	28/24
TOTAL	NA/NA	49/100	38/100	32/100	88/100	31/100	57/100	62/100	119/100

Table 4

Utilization By Major Field

	Undecided/%	Humanities/%	Science/%	Social Science/%
-2	1/12	8/23	11/29	8/21
-1	1/12	3/9	9/24	3/8
0	2/25	8/23	6/16	4/10
+1	2/25	8/23	6/16	11/29
+2	2/25	8/23	6/16	12/32
TOTAL	8/100	35/100	38/100	38/100

Table 5

Utilization By GPA

	.5-1.49/%	1.5-1.99/%	2.0-2.49/%	2.50-3.0/%	Mean[1]	Total[2]
-2	1/8	12/32	13/30	1/7	1.81	27
-1	1/8	7/19	3/7	3/21	1.99	14
0	3/23	4/10	7/16	5/38	1.99	19
+1	4/31	6/16	9/20	5/35	1.90	24
+2	4/31	8/21	12/27	0/0	1.79	24
TOTAL	13/100	37/100	44/100	14/100	1.88	108

[1]Calculated on basis of reported GPA.

[2]Some people did not report GPA.

Table 6

Family Incomes By Utilization

	Mean Reported Family Income*
-2	$ 29,291 (5)
-1	20,857 (2)
0	17,529 (2)
+1	18,060 (3)
+2	14,957 (5)
TOTAL	$ 20,182 (17)

*Number in ( ) is size of sample.

Table 7

Expected Incomes By Utilization

	Mean Expected Income First Years*	Mean Expected Income "Peak Years"
-2	$ 10,083 (12)	$ 25,730
-1	12,083 (6)	13,875
0	13,071 (7)	19,285
+1	8,661 (18)	22,357
+2	9,312 (16)	13,250
TOTAL	$ 9,990 (59)	$ 19,436

*Number in ( ) is size of sample.

Table 8

Reaction to Features By Utilization*

35 Year Repayments			Size of Repayments			Income Contingency			Availability Unrelated to Need			Freedom from Parents			Help Sibling Through College			Other		
+	0	-	+	0	-	+	0	-	+	0	-	+	0	-	+	0	-	+	0	-
										-2										
12	5	11	16	9	3	22	4	2	19	6	3	16	9	3	22	3	2	1	0	1
										-1										
4	2	10	12	1	3	15	0	1	13	2	1	12	3	1	14	1	1	1	0	0
										0										
13	2	5	17	3	0	19	0	1	16	2	2	14	6	0	19	1	0	0	0	1
										+1										
15	7	5	22	5	0	25	2	0	23	3	1	24	3	0	25	2	0	0	0	1
										+2										
19	5	4	25	3	0	27	1	0	24	4	0	26	2	0	24	4	0	0	0	1
										Seniors										
24	5	17	32	7	7	37	3	6	36	9	1	38	7	1	42	1	1	1	1	0
										TOTAL										
87	26	52	124	28	13	145	10	10	131	26	8	30	30	5	146	15	4	3	1	4
										%										
53	16	32	75	17	8	88	6	6	79	16	5	79	18	3	88	9	2	38	12	54

* + Favorable (+1 or +2) response; 0 Indifference; - Unfavorable (-1 or -2) response.

Table 9

Ranking* of Sources of Funds By Utilization

	Carleton Loan				Carleton Work				PAYE Loan				Family Contribution				Summer Work				Personal Savings				Other			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
-2	1	3	0	0	0	2	5	3	0	3	0	2	21	2	1	2	3	7	5	2	0	3	5	3	3	0	0	0
-1	2	2	0	1	3	2	3	3	0	1	1	1	8	2	2	2	1	7	1	0	1	0	4	0	0	0	0	0
0	1	2	2	1	0	6	0	2	4	1	3	3	8	2	2	3	5	5	4	0	0	2	5	2	0	0	1	0
+1	0	4	1	3	1	1	1	2	17	2	2	1	3	4	6	1	4	8	5	1	1	2	2	2	1	2	1	0
+2	0	9	4	1	3	7	3	1	24	0	2	0	0	4	1	4	0	3	8	6	0	0	3	6	1	2	1	0
Seniors	2	7	5	2	4	3	9	5	16	6	0	2	12	4	3	6	7	10	8	2	3	5	2	4	6	0	0	1
TO-	27		8		21		16		13		9		18		18		40		11		12		17		4		1	
TOL	6		12		11		21		61		8		52		15		20		31		5		21		11		3	
Total Votes	53				69				91				103				102				55				19			

* 1 = Most favored source
2 = 2nd best source, etc.

Table 10

Commercial Bank Student Loans:
Utilization, Reasons and Responsibility*

	UTILIZATION		REASONS				
	Have Considered Borrowing	Have Borrowed	Reduce Work Contract	Reduce Summer Work	Insuf-ficient Other Sources	Help Younger Sibling	Other
-2	2	0	0	0	0	0	2
-1	1	1	0	0	0	1	0
0	4	1	0	0	3	3	1
+1	10	1	1	1	7	3	2
+2	5	5	2	0	9	1	0
Senior	7	4	0	0	7	0	1
TOTAL	29/24%	12/10%	3	1	26	8	7

RESPONSIBILITY

	Student Alone	Student & Parents Together	Parents Alone
-2	10/36%	14/50%	4/14%
-1	7/44%	8/50%	1/6%
0	9/45%	10/50%	1/5%
+1	12/44%	14/52%	1/4%
+2	14/50%	14/50%	0/0%
Senior	25/54%	14/30%	7/15%
TOTAL	77/47%	72/44%	14/8%

* Sample of 165.

Table 11

Alternatives to Attending Carleton: State Supported or Private Colleges or Universities with Lower or Higher Costs (By Utilization)

	Private Higher Costs	Private Equivalent Costs	Private Lower Costs	State Higher Costs	State Equivalent Costs	State Lower Costs	Other
-2	0	1	0	0	0	2	1
-1	1	0	1	0	0	2	3
0	2	0	3	0	1	2	4
+1	2	4	5	1	0	0	3
-2	2	3	4	0	0	6	4
Total	7/12%	8/14%	13/23%	1/2%	1/2%	12/21%	15/26%

Table 12

Number of Siblings and Utilization

	0	1	2	3	4	5	Mean
-2	1	8	10	2	1	6	2.4
-1	1	1	7	5	1	1	2.5
0	1	5	6	2	3	3	2.6
+1	2	2	7	12	1	3	2.7
+2	2	8	6	5	6	1	2.3
TOTAL	7	24	36	26	12	14	2.5

Table 13

Off-Campus Utilization

	Off-Campus Utilization				
	-2	-1	0	+1	+2
-2	16	1	5	4	2
-1	2	7	2	5	0
0	1	3	5	5	4
+1	2	5	5	5	10
+2	0	1	11	5	11
Seniors	10	2	9	8	16
TOTAL/	31	19	37	32	43
Percent	19	12	23	20	26

Table 14

Reaction to Program's Availability

	Reaction to Availability						
	-2	-1	0	+1	+2	Total	Mean
-2	1	1	3	8	15	28	+1.25
-1	0	4	1	4	7	16	+ .88
0	0	0	2	12	6	20	+1.20
+1	0	0	0	6	21	27	+1.78
+2	0	0	0	1	27	28	+1.96
Senior	2	1	4	8	31	46	+1.41
TOTAL/	3	6	10	39	107	165	+1.46
Percent	2	4	6	24	64	100	

Table 15

Parental Reaction to Plan's Availability

	Estimated Parental Reaction					
	-2	-1	0	+1	+2	TOTAL
-2/%	5/18	6/21	9/32	5/18	3/11	28/100
-1/%	1/6	3/19	7/44	5/31	0/0	16/100
0/%	1/5	2/10	2/10	10/53	4/21	19/100
+1/%	0/0	1/4	2/9	9/41	10/45	22/100
+2/%	0/0	0/0	0/0	11/39	17/61	28/100
Senior/%	1/2	8/19	8/19	10/23	16/37	43/100
TOTAL/%	8/5	20/13	28/179	50/32	50/32	156/100

FOOTNOTES

1. See, for example: Becker, G., Human Capital, NBER. New York, 1964; or Journal of Political Economy, Supplement, Vol. 70, October 1962, "Investment in Human Beings".

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4. Bolton, R., "The Economics and Public Financing of Higher Education: An Overview" in U. S. Congress Joint Economic Committee The Economics and Financing of Higher Education, USGPO, 1969. passim pp. 40-43, 88-92.

5. Vickrey, W., "A Proposal for Student Loans" in U. S. Department of Health, Education and Welfare, Economics of Higher Education, USGPO, 1962. p. 274.

6. Friedman, M., op. cit., pp. 138-139.

7. Ford Foundation, "PAYE: A Progress Report" mimeo, New York: 1971. p. 8.

8. Yale University, "Yale Tuition Postponement Option. Background Detail for Release Morning Papers". mimeo, New Haven: 1971. p. 6.

9. Ashenfelter, Bowen, Bradford, Malkiel, and Rees, "The Educational Opportunity Bank: The Feasibility of a Pilot Project at the Graduate Level" mimeo, Princeton: 1970. p. 16.

10. The Panel on Educational Innovation, Educational Opportunity Bank. (Zaccarias Report), USGPO, 1967 passim.

11. Ibid., passim pp. 3-10.

12. Ford Foundation, op. cit., p. 10.

13. Becker, G., op. cit., passim, pp. 32-88.

14. Ashenfelder, Bowen, et al., op. cit., p. 7. See also: Shell, Fisher, Foley, and Friedlander, "The Educational Opportunity Bank: An Economic Analysis". National Tax Journal. Vol. 2. March 1968.

15. Ashenfelder, Bowen, et al., op. cit., p. 4.

16. U. S. Department of Commerce, Bureau of the Census, Annual Mean Income, Lifetime Income, and Educational Attainment of Men in the U. S., USGPO, 1970. p. 35.

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18. U. S. Department of Commerce, Bureau of the Census, Income in 1969, op. cit., p. 101.

19. Ford Foundation, "PAYE: Income Contingent Loans for Higher Education--A Preliminary Report". mimeo, New York: 1971, p. 7.

20. Robert Ras, Student Loan Officer, American National Bank, Interview, July, 1971.

21. Charles Howland, PAYE Staff Member, Yale University, Interview, July, 1971.